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Public Health the Basic Factor of Social Security*

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PROBABLY I should spend some time in expanding the customary platitudes about my gratitude for my elevation to a position of such distinction among my fellows. Having read Dr. Ravenel's monumental history of the American Public Health Association and having heard most of its Presidential Addresses for forty years, I can simply say to you that I thank you and that I accept the task you have assigned me with as much humility as is possible for a man of Irish extraction. I am sure I may also say, without invidious distinction, that I am especially honored in succeeding in the Presidency my friend, and our Chief, Dr. Thomas Parran. Were I to tell you what I know about him as a physician, a youngster in the tedious years of plodding routine in public health work, as an Assistant Surgeon General in a particularly difficult field, as a State Health Commissioner, as Surgeon General, I would merely describe to you the man and the administrator to whom we gladly give our allegiance and who, we know, will never falter in well doing.

My frank friends among you have placed me in a dilemma from which I find it difficult to extricate myself. Many of you have feared that I would talk too long; many more, that I would say too little; half of you have told me that you would leave the room if I start to read a formal address; the other half have bluntly said they will leave if I begin speaking extemporaneously. In trying my level best not to disappoint all of you, I am afraid you will find that I have followed the classic fable of Æsop and in trying to grasp the substance and the shadow, have missed both, and just got myself wet.

I shall attempt to solve my dilemma by following the example of one of my colored friends down in Southern Kentucky, who was a deacon in his church and always sat in the Amen Corner.

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One night his parson had preached a particularly moving sermon and many of his hearers began shouting. A comely young negress became highly excited and, after a few moments of shouting and shaking, first threw off her coat, then her jacket, then her shirtwaist, and when she began fumbling with her belt the parson exclaimed: "If any Brother looks upon the Sister while she is in the state of exaltation, he will be struck blind." My deacon friend put his hand over his right eye and whispered audibly, "Well, Parson, I will risk one eye on it." So, I shall keep one eye on the manuscript and the other on my audience and hope to give due consideration to both.

One of the most distinguished authorities in public health, Dr. Milton J. Rosenau, wrote:

> Preventive medicine dreams of a time when there shall be enough for all, and every man shall bear his share of labor in accordance with his ability, and every man shall possess sufficient for the needs of his body and the demands of health. These things he shall have as a matter of justice and not of charity. Preventive medicine dreams of a time when there shall be no unnecessary suffering and no premature deaths; when the welfare of the people shall be our highest concern; when humanity and mercy shall replace greed and selfishness; and it dreams that all these things will be accomplished through the wisdom of man. Preventive medicine dreams of these things, not with the hope that we, individually, may participate in them, but with the joy that we may aid in their coming to those who shall live after us. When young men have vision the dreams of old men come true.

Dr. Rosenau might well have paraphrased this high ideal by substituting "the medical profession" for "preventive medicine."

In 1879, Samuel D. Gross, one of the founders and afterward President of both the American Medical Association and the Kentucky State Medical Association, delivered the oration at the dedication of the monument at Danville, Ky., erected to the memory of Dr. Ephraim McDowell, whose performance and report of the first ovariotomy in that little village sixty years before enshrines him as one of the immortals in the history of surgery. He closed with the following prophetic words:

> Young men of the Kentucky State Medical Society, listen to the voice of one who has grown old in his profession, and who will probably never address you again, as he utters a parting word of advice. The great question of the day is, not this operation or that, not ovariotomy or lithotomy, or a hip joint amputation, which have reflected so much glory on Kentucky medicine, but is preventive medicine, the hygiene of our persons, our dwellings, our streets; in a word, our surroundings, whatever and wherever they may be, whether in city, town, hamlet, or country, and the establishment of efficient town and state boards of health, through whose agency we shall be the better able to prevent the origin and fatal effects of what are known as the zymotic diseases, which carry so much woe and sorrow into our families and which often sweep, like a hurricane, over the earth, destroying millions of human lives in an incredibly short time. The day has arrived when the people must be roused to a deeper and more earnest sense of the people's welfare, and when suitable measures must be adopted for their protection as well as for the better development of their physical, moral, and intellectual powers. This is the great problem of the day, the question which you, as representatives of the rising generation of physicians should urge, in season and out of season, on the attention of your fellow citizens; the question which, above all and beyond all others, should engage your most serious thoughts and elicit your most earnest cooperation. When this great, this mighty object shall be attained; when man shall be able to prevent disease and to reach with little or no suffering his three-score years and ten, so graphically described by the Psalmist, then, but not till then, will the world be a paradise, with God, Almighty, All-wise, and All-merciful, in its midst, reflecting the glory of His majesty and power, and holding sweet converse in a thousand tongues with the human family.

Every one here present will recall that in 1879, when these inspiring

words were uttered, Pasteur and Koch had just begun to show the results of their scientific research, and that cities, states and nations were not only intermittently paralyzed by epidemics of proportions beyond our conceptions, but that the people of this and other nations suffered from a crushing burden of continuous ordinary illness, which they accepted as just as necessary and commonplace as the succession of day and night and the changing of the seasons. Human nature has changed but little since 1879, as it had changed but little before. The consternation, fear, and expensive, and, too frequently, wasteful efforts at relief aroused in the mob psychology of that day by cholera and yellow fever, were similar to those which today mark the advent of an epidemic of meningitis or encephalitis.

Progress seemed terribly slow to the few impatient enlightened men of that time, as it seems now to you. Medical education was controlled commercially, and from our schools of medicine there came not only the leadership, which preserved its traditions and altruism, but a horde of incompetents who knew as little about the teachings of Hippocrates and the practice and science of medicine as they did about the movements of the stars. During all these years, however, as now, brilliant minds were seeing and demanding "first things first." The great State Health Departments of Massachusetts and Pennsylvania were initiating the plans for environmental sanitation and purification of water supplies that have made our urbanization and industrialization possible. Possibly the greatest medical statesman in America, Jerome Cochran, was writing into the Constitution of Alabama the responsibility of organized medicine for the training and control of its own personnel and placing squarely on the shoulders of the medical profession the responsibility for the care of the public health. Whatever progress was made then, and until a few years ago, was usually amebic in its character and came as a result of the advantage taken by one man of an irritant in the form of an incident, an epidemic, or a disaster. Typical of this, a slightly inebriated reporter, indignantly telling Henry Watterson of having been fed a horse-meat sandwich, started a movement resulting in scientific meat inspection in Louisville, which has continued since. Modern milk control in Kentucky was begun when a rugged individualist, who milked a few tuberculous cows in a dirty barn, took a potshot at a health officer who urged him to clean up. Similar instances might be cited, indefinitely, in every state.

Intelligent, broad-scale public health work on a real foundation began to take shape in this country with the formation of the Rockefeller Commission for the Eradication of Hookworm Disease. Conceived in the philanthropy and charity, in the true sense of that much abused word, of Mr. Rockefeller, this commission arranged for the practical application of the results of the scientific research of Stiles to the finding of hookworms, and to the cure, prevention, and eradication of hookworm as a disease. To this end, an army of full-time scientifically trained physicians was put in the field under the leadership of a very great educator in public health, the late Wickliffe Rose, and, later, our own John Ferrell.

Before this, many men had flashed into the proceedings of this Association thoughts from their experiences which have since been our armamentaria in the development of administrative practices. As early as 1904 my father was saying to the medical profession and people of most every county in the United States something which has not yet been done in half the counties in this country:

> And, still more important, a board of health for each city and county, or for the two combined, with frequent inspections of schools, dairies, abattoirs, bakeries, groceries, factories, tenements, sewerage and garbage systems, and with laboratories to which any citizen may bring water, food, drugs, diseased products, or anything else suspected as a danger to his family, for analysis without personal expense, is of as much practical importance as any court or other official agency could be. And it is not worth while to try to do those things without a health officer with special training and aptitude for his work, and such a salary that he can devote his entire time to it; for no man can be the kind of health officer here described and practise medicine. The positions are so incompatible that it would be just as reasonable to expect a lawyer to act as judge and support his family by the practice of law at the same time. It would be the best of investments to provide such comprehensive health systems everywhere, as substitutes for the political make-shifts so generally in vogue, because the greatest annual tax upon our people is not that paid into municipal, county, state and national treasuries, but the long unrecognized tax for preventable sickness and funerals.

Four years later, in 1908, the first full-time health department was organized in Jefferson County, Ky., under his leadership. Shortly afterward similar departments were developed by Lumsden in the State of Washington and Rankin in North Carolina. The subsequent development of such departments is well known.

During these formative years we had been accustomed to muddled thinking and consequent badly managed public affairs. In education, in law, in agriculture, in finance, even in that most primitive of all man's organized activities, war, we had a superabundance of brilliant theory, but very little of the practical, except as concerned the welfare of the small group of individuals who profited from any intelligent activity. Thoughtful men and women were talking about dangers to society from lack of foresight and a plan, but their voices were as of those crying in the wilderness.

Then, suddenly, to the thoughtless, the stock-market collapsed. An era came to an end. We awakened to find national, state, and local treasuries bankrupt, to realize that from 10 to 12 millions of people out of work had been added to the standing army of 3 million constantly unemployed. We never before had admitted that unemployment had reached even these lower figures. We found our banks closed and credit paralyzed. In many cities, school teachers, policemen, and firemen were unpaid, products of the factory were not being purchased at all; and the food supplies from the farm brought prices that destroyed the value of land, which, after all, is the basis of human economy. Amidst what seemed to be universal ruin health departments shared the debacle. The only thing that was left untouched in all of this destruction was the courts whose procedure and adherence to precedents had been so firmly embedded in our constitutional system by their lawyer writers that they seem intended to be the last surviving hazard to human progress from the old régime.

A man who had been acclaimed by many as the greatest public financier the world had yet produced, guiding the financial Ship of State at this period, is said to have made this gloomy statement at a breakfast party:

> I feel as a man who had traveled far afoot, and, awakening in the shade of a deep, stony, waterless valley, I look out and see no highway, no road, no path by which I can emerge; from my viewpoint, I can see in the awesome rocks that surround me not even a slight depression through which I may leave or hope may enter.

And, surprisingly, suddenly, a glimmer of light seemed to appear in this chaotic and awesome scene. By a gigantic recasting of the machinery, banks, insurance companies, railroads and great corporations were made solvent. Credit was restored; money

was revalued, so that it might be of service to rather than the master of, the people. The unemployed were at first merely fed and clothed, and then given made-work. A little later, began the real reconstruction of national resources—the thing of prime importance to every citizen, but which the few who had heretofore controlled wealth had neglected so long in their self-aggrandizement. These and forty other recovery plans were made possible because of the patriotism, patience, and good sportsmanship of the American people. They recognized in statesmen an interest in the welfare of all of the people, even those who had hitherto been forgotten, and they followed this leadership into the development of a planned social security, the mere foundations of which have now been laid, but which is probably destined more completely to revolutionize the activity of the human race than any other program ever enacted into law.

This plan includes the stability of banks, insurance companies, railroads, and corporations, and, through them, our whole financial structure, so they and it will serve all the people; the provision, through private capital or credit, or if these fail, through federal, state, and local coöperation, of work for the unemployed; large scale economic research in methods, still largely in the process of development, for settlement of the natural differences between capital and labor, for promotion of agriculture and agricultural markets and the conservation of our natural resources as the possessions of all the people; and the passage of the Social Security Act itself, with its broad provisions for old age assistance and pensions, unemployment compensation, aid for the crippled and blind, vocational training for those injured in industry, and, what is of first importance to you, increased federal assistance, so that the states may improve the local administration of public health, including maternal and child health, through state devised control, plans and policies. The operation of this plan for a couple of years has enabled us to develop statistics, on which public attention has been focused, showing the already too large and rapidly increasing number of people who are becoming charges on society because of ill health, mental or physical, unrecognized and untreated. This ill health is, in a large measure, due to causes which the leaders in medical science know how either to prevent or to cure in the early stages before invalidism or incapacity has become permanent. The facts and figures brought out may well make us question our methods, examine and reëxamine them to find where the fault is. In these sessions and in our plans for continuous learning in all of our health departments through the year, and in all the meetings of our allied organizations in nursing, dentistry, engineering and pharmacy, and in the great organization, the American Medical Association, we are all working together around conference tables trying to evaluate plans which will preserve the autonomy of the states, and develop procedures, tried and proved by social and scientific research, which will best improve health and lessen disease and accidents in our respective states, counties, or districts.

The best care of the sick individual is, ordinarily, by his own family physician, in his own home. The best treatment of complications in 99 per cent of all serious illness is by the family physician, in consultation with the consultant of his and the family's choice, in the best hospital in the general vicinity of his home. Just so, the diagnosis of health conditions and those which produce bad health must be studied and carefully planned by or

through the unit of government closest to the people. For administrative convenience and economy, this has been found to be the county or a combination of counties into a district.

Of equal importance is the provision in the Social Security Act for the actual recognition of the U. S. Public Health Service as the operating federal health agency. Before these dreams became realities, the recognition of any national responsibility for public health was embryonic, being entirely overshadowed by the functional medical service and regulatory activities of the old Marine Hospital Service, continuation of a considerable part of which was justified only by its antiquity. Even now this section of public health service responsibility absorbs 75 per cent of the personnel, and costs almost one-half the total appropriation for functions which Congress and the people believe are public health services, but which, whatever be their worth in other regards, in reality have little preventive value. Under Dr. Cumming's administration, a State Relations Service was developed which was so ideal in principle and so devoid of friction in practice that it may be studied with profit and imitated by other branches of the federal government.

The broad social plan embodied in the Social Security Act recognized and crystallized into law the evolution that we have all realized was taking place in the integration of social agencies under an age-old heading that we have loosely denominated as the general welfare. We find ourselves closely allied not only with the physician, the nurse, and engineer, but with the welfare agency, whose trained social workers of various kinds are as necessary as any of these.

Just before his death, Edgar Sydenstricker extended this thought with the statement that—

> The physician is as necessary to the public health as is the health officer or the sanitary engineer. The work of the private nurse or the visiting nurse is as necessary as that of the public health nurse. The hospital and its out-patient department are as necessary as the health department. The welfare agency, with its trained social workers of various kinds, is as necessary as any of these.

Further extending this, Dr. Bishop has well said:

> Thus are conceptions of the present phase of public health service and a preview of tomorrow's phase, with its relation to the social sciences, epitomized by a close student of the public health movement. More and more with the stabilization of our population and limitation of geographic frontiers must we study economic frontiers. Increasingly will this study bring us face to face with the consideration of vital economics as compared to physical economics. Hence, increasingly, must the knowledge of the social scientist aid in determining the scope of essential service and in the organization of effort for the rendition of service.

Since the passage of the Act, which recognized and enacted into law this thoroughly practical, ideal relationship, Dr. Parran's administration has been so thoroughly sympathetic and effective that it has presented to state and local governments throughout these United States a challenge which we could not evade if we would. All of the states have adapted their plans so as to accept federal assistance in money under the provisions of law, but too many are still giving lip service to public health. To many, the organization is still a mere form, devoid of substance or real service to the people themselves, whom it is intended to serve. Under the regulations of the Act it is provided that certain fundamental state-wide functions shall operate through well organized divisions of a state board or department of health. After expenditure of the minimum amount of money actually necessary to develop and maintain the required

state functions, it is the intention of this Act that there shall be developed and maintained local full-time public health service, which will be actually in touch with and in reach of the people themselves, in their lives and in their homes. The whole social challenge of today is whether state and local governments can function with sufficient effectiveness to justify their continuance, except in the vestigial capacity in which many counties are existing in many states. It is as manifestly impossible to provide any continuing program in any state or local government where the election of the health officer is a personal and partisan action of a governor or of a local political administration as it is to guide education on such a basis. It is unthinkable that states may continue to change their state and local health executives with each changing political administration and continue to merit or secure recognition or financial support from a thoughtful Congress.

It is perfectly obvious to the thoughtful citizen that public health policies and administration should be under the control and guidance of the organized medical profession. From the public health standpoint, it must be admitted that the present training of physicians is based too largely on the recognition and knowledge of the pathological and the methods of arrest or cure; too little on the recognition and knowledge of the normal and the desirability of its protection and preservation. The leaders in medical organization realize this and they will solve this problem, as they have solved others far more difficult which have confronted them.

Will you not here pause and consider with me for a moment what has already been accomplished under medical leadership? Cholera and yellow fever and similar plagues are now historic to our people. Smallpox, which 150 years ago was the greatest scourge of mankind, is entirely eradicated among the intelligent. Diphtheria and typhoid fever are approaching the vanishing point. The incidence of tuberculosis has been decreased 60 per cent during this century, and enough money has been saved from lower morbidity and mortality from this one disease alone to pay the cost of our state and federal highway system. It has been clearly demonstrated that scarlet fever is eradicable, and it is almost as certain that whooping cough is. Massachusetts and New York are proving the possibility of reducing the annual death toll from pneumonia by 50 per cent or more, and cancer control in these two great states is approaching a standard of excellence that will cause all of the other states to imitate their methods. Less has been done in controlling syphilis and gonorrhea than any other major pestilence, but, under the fine leadership of Dr. Parran, this shadow on the land is destined ere long to disappear under the actinic rays of scientific knowledge properly and continuously applied wherever an individual harbors these dread infections.

The death rate in Kentucky has been reduced two-thirds in 27 years, and the life expectancy has been increased from 32 to 60 years. You should warn your people, however, that this low rate cannot be continuously maintained, because, eventually, those who have been saved from unnecessary illness and premature death during their earlier or productive years will succumb to the degenerative diseases of age, which are only now beginning to be studied with a view to their control and elimination.

It should be remembered that when Dr. Gorgas went to Panama to assume control of its health department he found that the French had known as much about engineering, as much about labor mobilization and organization, as much about the commissary and its management, as we did; but he found

that half the Frenchmen who came to build the Canal died with yellow fever or malaria before they had time to take any part in digging the great waterway. His complete and rapid eradication of these diseases changed the whole picture of life on the Isthmus, which was rapidly transformed from one of the pestholes of the earth into the healthiest spot in which men live and work. It should be recalled that, instead of reducing the quantity or quality of those engaged in medical service, this happy condition increased both, because recognition and preservation of health required a more highly trained personnel, and the discovery of incipient disease while it is still curable is far more time consuming and difficult than the diagnosis of a fatal illness and its resulting post-mortem. When it is considered that the death rate in the Canal Zone is today, and has been for 20 years, about half that of the registration area of the United States, and that the morbidity rate is approximately one-twentieth of that of this country, it can be demonstrated to any thoughtful appropriating body that public health is purchasable and that good health can be secured for any state or community willing to pay the price.

You and I sometimes may feel discouraged and irritated by the ignorance and parsimony of officials and appropriating bodies, but the victories for health which Dr. Gorgas won in the Canal Zone were won in spite of the constant and malevolent opposition of his superior in control of the construction. Dr. Gorgas was fighting for humanity and he never lost his temper and never failed. He set an example in scientific knowledge, sound administrative procedure, development of trained personnel, persistency against official contumacy and opposition, and tact and diplomacy against apparently overwhelming control, which gives his memory to us as that of the ideal health officer, the ideal official, the ideal gentleman.

We must not only have freedom from pernicious partisan politics in our state, federal and local health organizations, but we must have continuing learning on the part of every individual connected with them, whether these individuals be physicians, nurses, engineers, dentists, educators, sanitary instructors or inspectors, technicians, or the stenographic and clerical assistants. This was provided in the Social Security Act. Not only should it be continuous in the staffs of the state departments themselves, but the personnel from groups of contiguous counties should be assembled at regular intervals for the acquisition of newer knowledge, comparison of methods and for that attrition of mind against mind that has been largely responsible for progress in the science of medicine through medical society meetings, as well as in formal refresher courses and graduate courses in universities having established departments of public health education.

What shall we do about medical service for those who are ill? I would urge that we make it our first objective to do well what has already been assigned to us by the common consent of all the people, with the approval of the medical profession, in the public health field. We should oppose, at all hazards, the socialization of medicine. We should give every assistance to those of our profession engaged in the practice of curative medicine in the solution of their problem of medical care of the indigent and of those only partially able to bear the cost of illness. The medical profession of America has proudly carried on the traditions which have been handed down from leader to leader since the days of Hippocrates. Sometimes the banner of science has seemed to be beyond the horizon of those who

most needed its encouragement; but it has always been found again and borne aloft by succeeding generations of those who have given this great service to mankind. Every other progressive agency has helped to promote and improve civilization, but no other can claim to be, or be acclaimed as a more faithful servant of mankind. Be assured that the American Medical Association, its autonomous constituent state associations, and component county societies are fully alive to their responsibility. Be not impatient with their progress. Prod and threaten them a little, if you will. Remember that they have always lived up to their responsibility to the people of this country and they always will. It is perfectly obvious that so great a service organization would, if it could be assimilated and controlled by any one of the social groups that would put their unhallowed hands upon it, be a conquest whose value would be beyond computation. But let these groups beware, because should they win such a costly war, it would become a Pyrrhic victory. The finer qualities that now characterize the physician would soon disappear in the routine of the official. As for the public health group in the medical profession, it behooves us to remember with pride the research, the achievements, the service, the lives of those who made all our knowledge possible. And we should recall constantly to ourselves, to our brethren, and to all the world that we are physicians, doctors of medicine, proud of our calling, ready to modify our plans and our methods whenever better ones can be devised. So long as we do this, we may look forward to the future unafraid.

It is not enough to stop with this tribute to medicine. It was about 72 years ago that the Lady of the Lamp walked through the darkness of the Crimea, and, with a tiny spark, aroused a force that has inspired the world. And yet for 40 years after Florence Nightingale lived and worked most people died during the ministration of Sairey Gamps. Clara Weeks and her associates began the systematic education of nurses within the memory of many now here. We have just celebrated the 25th birthday of the National Organization for Public Health Nursing. The public health administrator who would not bow to this fine group of those who serve would fail to recognize the right hand of medicine.

The work of the sanitary engineer needs neither recognition nor encomium from me. It is he who has made the city and the large industrial plant possible, and he is now robbing the countryside of many of its lurking dangers. It is to be doubly regretted that this splendidly developed and highly trained group of specialists should have been ignored and the whole principle of states' relations should have been violated, by the ill advised inclusion in the last Rivers and Harbors Bill of an amendment providing for a survey of stream pollution in the Ohio River by the Army Engineers. They are unacquainted with this subject, untrained in the solution of the problems involved, and their recommendations will be without real value. It is to be noted that the bill was signed with a protest by President Roosevelt against the transfer of this activity from the Public Health Service to the War Department. I strongly recommend that the Association again endorse the Vinson-Barkley Bill as it passed the House of Representatives. This legislation was prepared by joint committees of this body and the State and Provincial Health Authorities of North America, and its enactment was delayed in the last session by an attempt to provide for federal injunctive processes in connection with problems wholly within

the province of the various state health authorities.

In public health administration we are finding important support from one of the oldest of the professions which has, within a decade, developed a remarkable attitude toward modern dentistry's responsibility to public health. The researches of Billings and Rosenow in focal infections seemed, for a time, to fall on the deaf ears of the old time mechanical dentist, but the improvement in dental education has quite kept pace with that in medicine. The modern dentist is quite as much a part of the force that is improving public health as is any other profession. It is a particular pleasure to welcome a large group of dentists who are specializing in oral health into membership into this Association, to whose proceedings they can contribute much of practical interest.

In those engaged in public health education, I desire to recognize both those who must interpret us to ourselves and those who must make our purposes, methods, and objectives understood by the people. Theirs is truly a Herculean task and they are making fine progress toward its accomplishment.

I would express your appreciation to the sanitary instructors and inspectors, the technicians, the stenographers and clerks who are the burden-bearers in all of our work. It is not theirs to shine in the light of public approval, and yet, without them, how much slower would be our progress, how much more difficult our job.

In conclusion, may I say that, in the majority of the states, we are ready to take the next step. We need to secure larger, better trained personnel; to have more laboratory facilities; to have better equipment for our statisticians and technicians; and more travel for our field personnel. We need above all, to have more money for those county or district health departments where the human and economic needs are too great for them to bear this cost alone. To do all this, we need more money; to secure it, we need to integrate our service in public health, first, with the medical profession, and then, with every other social agency, including the great organizations of women who have given such active and intelligent support to public health progress, whose special value to themselves and their children they recognize. After all, the American people must decide whether they want freedom from syphilis and tuberculosis, a reduced death rate from cancer and pneumonia, less blindness and crippling, and increasing happiness and health in old age. If they determine that they do, they must, in addition to their support of their own physicians and nurses who care for them when they are sick, pay the cost of the increased community service which we know how to render and can render at a per capita cost so insignficant, in comparison with the beneficence of its results, that it may be easily justified of all men.

I invite you, one and all, to join me in a reconsecration of ourselves in that spirit of service which the Great Master so nobly exemplified, remembering always that the Great Physician was also the Great Teacher, the Great Social Worker, the Great Laborer, and the Great Humanitarian—one who considered nothing foreign to him which affected in any regard the welfare and happiness of mankind. I invite you to wear with me an invisible uniform, yet one which, whether worn by us or by those engaged in the great allied services, will be universally recognized as the uniform of an army battling for humanity—that men may have sounder minds in sounder bodies and thus be enabled to labor, to reason, to live and to produce, more happily, more effectively and more abundantly.

The Health Department in the Field of Medicine*

From the Standpoint of Experience in England

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MY allotted subject at once raises the question—What is the "Field of Medicine"? Time prevents me from contending that medicine is directly or indirectly concerned with every aspect of human life, for not one of these is without its influence on health, with the maintenance and resumption of which medicine is concerned.

But I accept, for the purpose of this discussion, the conventional limitations of medicine, and proceed on the assumption that we are concerned with the two great departments of medicine, preventive and clinical, in which we all are, or have been, actively engaged.

But, even thus, I find it necessary to make further limitations; for while I claim that the health departments of the State (including the official departments of cities and counties who have health officials) are *concerned with every branch of clinical medicine*, I must omit from my purview in this discussion some portions of preventive medicine, including the prevention of industrial and other accidents.

I have always maintained that a problem or subject can only be satisfactorily discussed in the light of knowledge of the stages by which the present position has been attained. It is by reviewing the factors concerned in past growth, that we can best learn prospects and hopes for the future.

For while it is true that irregular, intermittent, and ofttimes unbalanced growth is characteristic of social life, real growth is thus distinguished from schemes devised at a desk, which like mules commonly have no respectable paternity and are, furthermore, foredoomed to sterility.

Let me then attempt a lightning review of health departments in Britain. The first activities may be said to be prenatal, before Health Authorities existed.

My first illustration concerns the medical administration of the British Navy. In 1795, nearly half a century after its value was known, a daily ration of lemon juice was required to be taken by all sailors in the Navy. Prior to this, sailors had often been rendered

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helpless by scurvy, and the British Navy had been crippled in its fighting power, just as in later years the Japanese Navy was decimated by beriberi, until my fellow student Takaki introduced dietetic improvements for the Japanese sailors.

But scurvy was an illustration of compulsory reform in a compulsory service. Reform consisted in compelling sailors to swallow an unwanted daily drink to prevent a deficiency disease. The introduction of compulsory Jennerian vaccination against smallpox in 1840 affected the entire population of Britain. At that time, no Health Authorities existed, but Boards of Guardians undertook the succor and care of the destitute, which since Elizabethan days had been a national duty. A special public vaccinator was appointed in each area, whose duty it was to vaccinate all infants, except those whose parents preferred that their family doctor should do this.

This then was the first English example of *complete socialization of medical provision* in one particular respect. The provision still exists, though its compulsory character has been modified and, strangely enough, the administration of this national *ad hoc* medical provision remained until 1929 in the hands of Poor Law Authorities, long years after Health Authorities had split off from the authorities concerned with relief and treatment of the sick poor.

But it will be noted that, right away from Shaksperian days, no impoverished persons in Britain needed to suffer from lack of food, shelter, or medical care, the Boards of Guardians being under an obligation to supply their need. True that for a long time the medical aid was incomplete and imperfect, often scandalously so, but it remains true that for several centuries in Britain there has existed national provision for the general all-round medical treatment of those who cannot provide it for themselves.

Let me follow this medical treatment for the destitute further. Destitution has been defined to include inability to provide personally the medical care required for a given illness; and in the widest acceptance of this definition, how small a proportion of the total population of Britain or of the United States can be said to be other than destitute?

But limited in its application though it has been, the medical treatment of the destitute has improved enormously in the last 30 years in Britain; and in 1929 the possibility of further important progress was secured by handing over all official treatment of the sick to the great Public Health Authorities of cities and counties. It was further provided that any inhabitant of a given area should be entitled, if a suitable patient, to admission to the newly organized municipal or county hospitals. Thus the proviso of destitution as a condition of treatment was abandoned, but the Local Authority was instructed to assess each patient's capacity to pay a proportion of the cost of treatment. In practice the majority of patients in these institutions are treated gratuitously or at a small charge.

It will be noted that in Britain medical officers of health acting under the supervision of the elected members of their Public Health Committees are now responsible for general supervision and direction of the domiciliary and institutional treatment of the sick in their areas, in addition to their more general preventive work. This unifying principle exists, though in practice there is much delegation of duties.

There exist alongside of these official hospitals the voluntary or private hospitals, special and general, which in the past have borne such an important part in the treatment of the sick poor and

in the promotion of medical education; and although there are increasing difficulties in keeping up with the voluntary gifts called for by the necessarily increasing cost of treatment, they will doubtless continue for long years to participate in providing medical aid for the public, especially in our great centers of population.

Let me cite further more modern illustrations of the fact that treatment and prevention are Siamese twins. In the special period of rapid sanitary advance occurring between the 40's and 90's of the 19th century, Public Health Authorities concerned themselves chiefly, though never exclusively, with external sanitation, including scavenging, removal of nuisances and especially of excremental matter, sewerage, even more with measures for protecting water supplies, and for cleansing of houses and reduction of overcrowding. The immediate enemies aimed at were "fever" and cholera. Typhus began to decline, and this reduction was regarded as due to domestic cleansing and disinfection. It was even more due to the segregation of the sick in "fever hospitals."

Typhoid or enteric fever also declined under the new sanitary regime, and its reduction was attributed to better house drains and the reduction of noxious smells; but looking back we can be certain that the main factor was the safeguarding of public water supplies. (Carriers and shellfish as provokers of infection had not yet been ascertained.)

Fear of Asiatic cholera with hopes of reducing "fever" had been the chief factor favoring sanitary reform; and as regards both cholera and fever, treatment had been an indispensable measure. I recall that late in the 80's some health departments were still giving out gratuitously bottles of "Diarrhoea Mixture" when asked for by any inhabitant.

In the early years of the present century there came a revulsion against the exclusively "sanitary" point of view. After all, man as well as his surroundings needed attention. I cannot now follow the zigzagging progress of the personal aspect of health in chronological order. Very soon it overstepped the point of view of disease prevention by treatment, and became also a search after the retention and enhancement of health.

In 1902 the first Midwives Act was passed, bringing midwives under supervision and some partial control. We need perhaps to be reminded that usually childbearing is a physiological not a pathological process. Leaping forward, I can only stay to note that now Health Authorities are obligated to provide and pay for deficiencies in the midwifery service of their area.

Let us glance at the partially physiological child welfare services organized by Health Authorities, often with the help of the pioneer work of voluntary organizations. I can merely mention the vast number of health visitors now employed, and the child welfare centers in every area. They are mainly advisory and as such their value is beginning to be appreciated, by the parents not only of the poor, but also by others. It has been found impracticable to draw a strict line between hygienic advice and clinical treatment, especially for minor departures from health.

The same remark applies to the school medical service, which in most counties and boroughs is conducted from the health department. A vast number of defects, especially of the special senses, of the skin, and deformities, have been discovered, and even with full use of private medical practitioners, the education committees have found it necessary to organize measures on a large scale for the treatment of discovered ailments. Treatment

follows detection, and detection follows medical supervision. For dental caries a vast amount of dental treatment is undertaken by public health authorities, much of it gratuitously.

We may now hark back to the clinical side of public health work, having sufficiently indicated the impossibility of preventing preventive and curative measures becoming entangled, when we attempt to do for children and their mothers what we all agree is preventive work.

In 1911 was passed the National (Health) Insurance Act, which provided *inter alia* for the domiciliary medical treatment of one-third of the total population of England and Wales. The cost of this was provided in nearly equal sums by the worker and his employers, a large additional portion being also paid by the state.

Here then is a vast system (chiefly for heads of families and workers only) of ordinary medical treatment excluding (in the main) institutional treatment, provided by private medical practitioners chosen by the insured themselves; and it may be said at this point that the doctors themselves would resent and oppose proposals for the abolition of this communal medical practice.

Insurance medical practice has little direct relationship to the official health department, but this artificial separation cannot indefinitely continue, for closer union would greatly facilitate the conversion of insurance clinical practice, into a vast provision for utilizing private medical practitioners in the rôle in which they would become, as I have frequently urged, " medical officers of health within the range of their own medical practice."

But the present position is significant as an example of what is a modified state service of medicine with the retention of all that is good in private medical practice.

My enumeration of the necessary interest and participation of health departments in the clinical practice of medicine is not yet completed.

I have stressed the growing conviction of medical officers of health that they are concerned not only in the prevention of illness but also in the prevention of the continuation of illness. This is shown in antituberculosis work. Notification of cases of phthisis began, sanatoria were opened, domestic advice to patients and their relatives was given by health officials before 1911, but in that year a great impetus was given to universal adoption of such measures by generous government grants for the erection of hospitals and sanatoria, and 50-50 grants to local authorities in aid of local activity in antituberculosis activities.

My last illustration is especially significant. Before the Great War a Royal Commission, of which I was a member, was appointed, and early in 1915 we were in a position to recommend that Health Authorities of counties and large boroughs should concern themselves with the setting up of official centers for the treatment of venereal diseases, the central government paying three-fourths and the local authority only one-fourth of the cost of these centers and of diagnostic laboratories. I was then the head of the Public Health State Department concerned in organizing these measures. Very soon a vast network of treatment centers had been initiated. The Local Authorities had imposed on them the direct obligatory duty of starting these, and of arranging that treatment should be given by competent specialists, should be carried out under conditions of secrecy, and that it should be gratuitous, entirely irrespective of the financial or social circumstances of the patient. The success of these measures has been very great, especially in regard to syphilis. But I draw attention to the

fact that this is the first illustration in modern public health administration, in which the treatment of a given disease has been completely socialized—in the sense that treatment is given to every applicant gratuitously, without residential restrictions, and by specialists possessed of special knowledge of the treatment of these diseases.

We need to go back to the early years of the 19th century for an example of a similar measure on a national scale, that of vaccination against smallpox. Now great pox is being similarly treated.

But the difference between these two examples and the rest of medical practice is one rather of degree than of kind.

Infectious diseases, including tuberculosis, are being treated chiefly at the expense of the organized community. A vast amount of midwifery work and of work for infants and school children is being done under somewhat similar conditions.

Do coming events cast their shadows before? I prefer not to prophesy. I prefer not to attempt to suggest that British methods can be applied to American conditions. I refrain even more carefully from drawing attention to the vast extent to which the gratuitous treatment of sickness is practised on this side of the Atlantic. Its amount surprised me when I began to enumerate the American items of such treatment. But my task is completed, for I undertook merely to sketch, in bare outline and necessarily imperfectly in view of limitations of time, the various and multiform ways in which health departments in Britain are concerned in supplementing private medical practice, and in insuring that no sick child or adult fails to secure what the principles of public health call for.

Sanitation and Quality Control in the Fishery Industries*

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THE quality of fresh fish may be lowered by two types of decomposition—enzymic or autolytic and bacterial. The former always occurs even though conditions may prevent bacteria from entering and decomposing the flesh. The fish on boats are usually well iced to keep the counts down, in addition to being very well protected by skin and peritoneum against inroads of bacteria into the flesh. It follows that it would be more sanitary to merchandise fish in the round than in the form of fillets which have no protection against bacterial invasion and are subjected to numerous opportunities for contamination. Nevertheless modern consumer demands require fish to be merchandised in fillet form. The problem resolves itself into getting fish as fresh as possible and then preventing the bacterial decomposition, which decreases its sales life.

Filleting has about trebled the demand for certain species such as haddock, with the result that fish has become so scarce in formerly well stocked haunts as to require trips to fishing banks 700 miles away, although such a trip takes about 12 days allowing for only 6 days actual fishing. From such a trip the oldest fish are about 9 days old upon arrival in market, while the youngest are 3 to 4 days old. Bacterial analysis proved unsatisfactory for differentiating between fresh and stale fish because a 9 day fish is of low quality even though the flesh is practically sterile. Autolysis proceeds regardless of bacterial count and is more responsible than bacterial decomposition for the low quality of much of the fish landed. The electrometric titration test of Stansby and Lemon, which presumably is a measure of the loss of natural buffering effect caused by autolysis, has been investigated. Our experiments indicate it to be suitable for rapidly grading large quantities of fish according to quality.

This paper is presented in two phases, the first being a critical examination of the freshness test, the second describing some sanitary aspects of commercial fish production.

STANSBY AND LEMON FRESHNESS TEST

Because of the great difference in the quality of fish landed from the same boat it is obvious that some method of distinguishing different grades of quality is necessary. Up to the present time the quality of fish has been determined largely by appearance which varies with the care used in handling rather than with age. Autolysis induced by age is more responsible than bacterial decomposition

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TABLE I

Relation of A and B Values to Quality of Fish

When B-value is below 8 and	A = 26 +	quality = excellent
	A = 24 to 26	quality = very good
	A = 22 to 24	quality = good
	A = 20 to 22	quality = fair
	A = below 20	quality = fair
When B-value is 8 to 10 and	A = 26 +	quality = very good
	A = 24 to 26	quality = good
	A = 22 to 24	quality = fair
	A = 20 to 22	quality = poor
When B-value is above 10 and	A = 26 +	quality = good
	A = 24 to 26	quality = fair
	A = below 24	quality = poor
When B-value is above 16	A = . . .*	quality = poor

* When the B value is over 16 the quality is usually too poor to use regardless of the A value.

for loss of quality in iced fish. Hence we have made an investigation of the Stansby and Lemon[1] electrometric titration by which they were able to establish the number of days iced haddock had been out of the water. This study has resulted in commercial use of the titration for grading haddock. Although further work is now being done to calibrate the test for other fish it is that on haddock that is here reported.

Briefly, the Stansby and Lemon titration test is as follows:

1. Titrate electrometrically an aqueous solution of 5 gm. of fish with $\frac{N}{60}$ HCl to a pH of 6.0. The number of c.c. of acid required, being recorded as the B value, is claimed to represent the amount of bacterial decomposition.

2. Titrate from a pH of 6.0 to a pH of 4.3, the number of c.c. of acid required being the A value which is said to represent the autolytic decomposition. We have found no constant relation between the A and B values and for practical purposes it has been found advisable to consider only the A value. However, the B value cannot be entirely disregarded, especially when high. In fresh fish B values may range from 1 to 8; above 8 they take on a definite significance.

The calibration of the method for use on haddock consisted in comparing the quality of fish as determined by cooking tests with the results of the titration test. The outcome of this preliminary work established temporary standards of quality as indicated in Table I.

In order to prove that the above standards of quality would actually work, an extended practical test was conducted including a sufficient number of samples to provide adequate statistical analysis. Samples of fish were graded by an expert buyer and then filleted, one fillet being given to the investigator to be tested electrometrically, the other being frozen and held in storage for a cooking test. The actual grade given by the buyer was withheld from the investigator until the electrometric value was determined. The frozen samples were cooked in the same manner each day during the period of the test and examined by the same group of people participating throughout the period. It is readily seen in Table II that the electrometric titration is as reliable as the opinions of experts. Moreover it provides a numerical value which may be used as a standard of payment for fish on the basis of quality.

The following values were used for comparison of the chemical data with the organoleptic tests.

Excellent . . . . . A value above 26
Very Good . . . . . A value between 24 and 26
Good . . . . . A value between 22 and 24
Fair . . . . . A value between 20 and 22
Poor . . . . . A value below 20

The Stansby and Lemon electrometric titration having proved practicable and accurate in the preliminary tests, it remained to be put into actual practice. Previous work indicated that the time required to make a test was approximately 25 to 30 minutes but that much of this time was occupied in the preparation of the sample because it had to be thoroughly mixed. By using a Buffalo chopper for grinding and mixing and by means of a 4 sample set-up connected to a multiple switch (Figure I) it was found that 4 samples could be tested in a minimum of 36 minutes. Even this is deemed too slow for commercial use so that at present there is under construction an apparatus by which it is expected to make possible the automatic titration of several samples simultaneously and to cut the average handling time to less than 5 minutes per sample.

STATISTICAL ANALYSIS OF DATA

The data obtained upon individual samples indicated in Table II were subjected to a thorough statistical analysis by O. E. Sette, in charge of the North Atlantic Fisheries Investigations for the U. S. Bureau of Fisheries. His analysis indicated that so much variation in quality existed in a boatload of fish that at least 80 individual fish would have to make up the composite sample for testing. This proved both uneconomical and time consuming. Moreover, in practice, business on the Boston Fish Pier is usually carried on in units of cartloads of about 2,000 lb. each. A third test was conducted therefore to determine the size of a sample necessary to represent the quality in a cartload of fish. Twenty individual fish from each of 5 cartloads were selected from 20 different locations in each cart.

The Standard Deviation (δ) for the A value of the above test was 1.06 c.c. for 5 carts and 1.16 c.c. for 4 carts. This latter figure was used in making further calculations. Thus to obtain a representative sample whose mean would lie within 1.0 c.c. of the true mean value 95 per cent of the time 5 fillets proved to be the right number to use as a sample. These should be from 5 different fish however. With this size sample a true mean value 2.0 c.c. below the experimental mean value would occur only once in 20,000 times. In our second test (Table II) we had already established an A value of 22.0 as the lower limit of quality acceptable for freezing for long term storage.

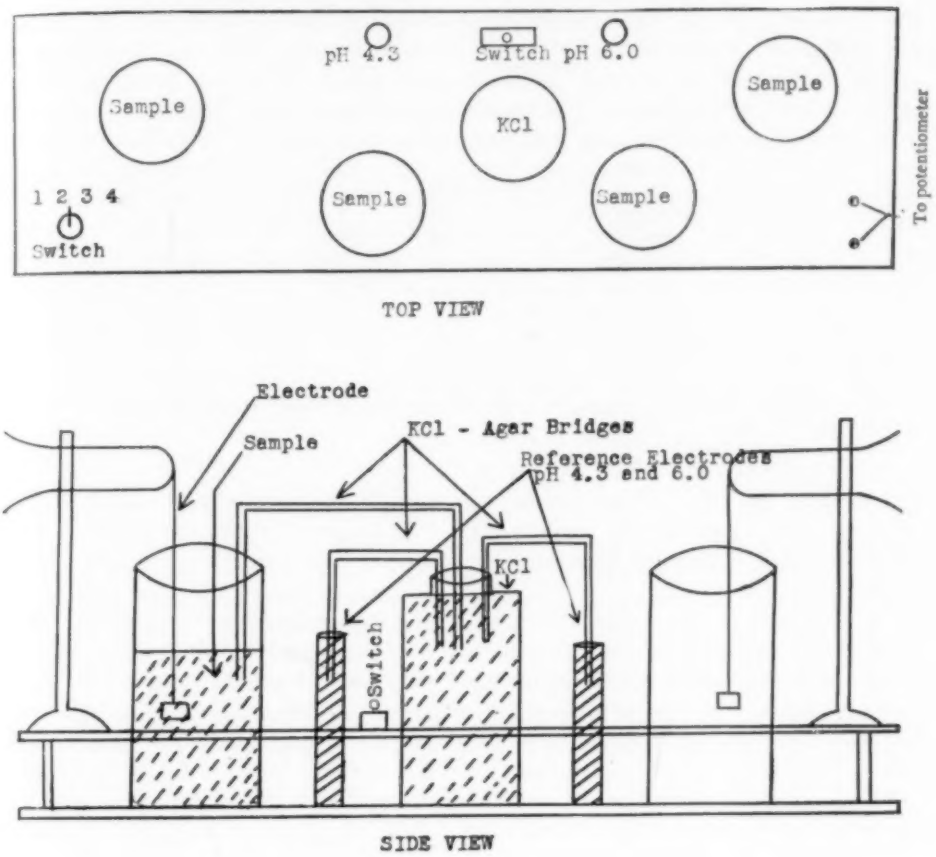
To interpret the above results, let us

TABLE II

Chemical Versus Organoleptic Grading

	Grade Given by Professional Buyer		*Chemical Analysis*		*Cooking Test*	
Grade	*No. Samples*	*Per cent*	*No. Samples*	*Per cent*	*No. Samples*	*Per cent*
Excellent	6	5.0	2	1.6	2	2.1
Very Good	7	5.7	21	17.5	9	9.6
Good	50	41.7	52	43.3	47	50.5
Fair–Good	17	14.1	..	....	..	....
Fair	28	23.3	32	26.6	25	26.8
Poor	12	10.0	13	10.8	10	10.7
Total	120		120		93	

FIGURE I—Four Sample Hook-up for Freshness Test



assume we obtained in the actual testing for each of 100 carts of fish, the border-line value $A = 22.0$. In the light of the above statistical analysis we would then know that the true mean value of all the fish in these carts would not be below $A = 21.0$ nor above $A = 23.0$ and then only 1.25 per cent of the fish would have a true A value below 21, and only 0.4 per cent would have an actual value below $A = 20.0$. Thus if we obtain a value $A = 22.0$ in actual practice we can be positive that on the average not more than 2 fish in a cartload would actually be of poor quality even though $A = 22.0$ is the lower limit of quality.

The above test is now used only for haddock, but the work is well along on cod, red perch (rosefish), pollock, and other species. However, it is a little premature to suggest that the method may revolutionize the purchase of fish generally throughout the industry.

SOME SANITARY ASPECTS OF COMMERCIAL FISH PRODUCTION

SANITARY CONDITIONS AT SEA

Practically all fish, except mackerel and red perch (rosefish), are gutted at sea. This method prevents anaerobic putrefaction of the intestinal contents during stowage, but it smears all surfaces with the intestinal bacteria. These remain and multiply on the surfaces but do not work their way into

TABLE III

Bacterial Condition of Fish as Landed

Sample No.	Slime (a)		Flesh (b)		Gills (a)
	Back	Nape	Back	Nape	
1	3,021,000	1,035,000	2,000	....	.....
2	5,000,000	415,000	2,000	1,650	.....
		1,000,000	7,000*		
3	25,000,000	1,045,000	2,900	650	.....
4	1,430,000	196,000	2,900	2,300	.....
5	950,000	81,000	7,300	1,600	.....
6	10,200,000	6,600,000	....	....	3,050,000
7	9,600,000	6,000,000	....	....	2,400,000
8	9,300,000	3,800,000	....	....	2,000,000
9	545,000	430,000	....	....	.....

(a) Counts per gm. of slime, etc., scraped from surface with sterile knife.
(b) Counts per gm. of flesh; contamination into the flesh being due presumably to the method of handling aboard vessel by means of forks.
* 5 days in ice water.

the flesh to any appreciable extent, so that most of them can be washed off or disinfected. This is illustrated in Table III.

PRECAUTIONS PRIOR TO FILLETING

The microbiological condition of the surface decides the degree of contamination of the plant equipment and the final products. Two washes and a scaling usually are given to remove such surface contamination. The wash water usually contains a residual of 1 to 2 p.p.m. of chlorine. For obvious reasons it is desirable to wash the whole fish outside the plant. Table IV shows that it is desirable to pass the whole fish through at least 2 different chlorinated washes before bringing them into the plant. The gills are not easily cleaned in this manner and the bacteria beneath the scales cannot be removed except by removing the scales or skinning the fish. Table V

TABLE IV

Results from Washing Whole Fish

Back		Nape		Gills		Per cent Decrease			
Before	After	Before	After	Before	After	Back	Nape	Gills	Remarks
10,200,000	1,150,000	6,600,000	730,000	3,050,000	2,130,000	89	89	30	3 Washes, middle 6.5 p.p.m. Cl_2
9,600,000	1,040,000	6,000,000	700,000	2,400,000	2,250,000	89	89	6	1 Wash, 6.5 p.p.m. Cl_2
9,300,000	600,000	3,800,000	440,000	2,000,000	650,000	94	88	68	Soaked 5 min. in 6.5 p.p.m.
5,555,000	545,000	.....	.....	1,675,000	190,000	91	..	89	3 washes, 1st & 3rd in 6.0 p.p.m. Cl_2
11,900,000	2,900,000	.....	.....	2,100,000	225,000	82	..	89	Same as above

indicates that *E. coli* when present cannot be consistently removed even by holding 2 minutes in water containing a residual of 100 p.p.m. of chlorine. Hence, beyond the amount necessary to keep the water sterile there may be only slight advantage in the use of chlorine on whole fish. A thorough washing is most effective (Table IV).

As fish are scaled the scales should be removed with strong sprays of clean water as the scaled surface will remain highly contaminated otherwise. Removal of scales before washing facilitates cleaning. This is illustrated by a case where the bath in 6.0 p.p.m. chlorine reduced the count from 487,500 to 33,750 on the surface where the scales were not removed and to 4,750 on the surface where the scales had been removed. Regardless of the many washings some slime still oozes from the pores. Thus even though the fish has been scaled and washed, further contamination of the equipment is caused by this slime.

PRECAUTIONS AFTER FILLETING

Birdseye [2] has shown how necessary it is to use extreme care throughout the filleting process to keep the counts down in the final products. For comparative purposes his data are given as follows (counts representing 1 gm. of slime scraped from the surface with a sterile knife): (1) Original slime count 3,021,000; (2) after washing in 6.0 p.p.m. of chlorine—1,035,000; (3) after being iced and held 15 hours at 32° F.—1,853,000; (4) after passing through scaler, (a) back, 2,140,000—(b) nape, 911,500; (5) slime on surface of cut fillet, 1,400,500; (6) count per gm. of same meat 153,900; (7) slime of fish after contact with conveyor—2,067,000; (8) count per gm. of same meat 144,600; (9) slime of fillet after brining at 35° Sal. and 2 p.p.m. residual chlorine—97,600; (10) count per gm. same meat 77,450; (11) count per gm. meat of fish 24 hours after freezing and storage at —20° F. 31,950.

TABLE V

Effect of Washing in Hypochlorite Solutions on E. Coli

Parts/Million Chlorine		*Gas Tubes Lactose Broth*		*Confirmation on E.M.B. Agar Plates*	
		Before	*After*	*Before*	*After*
10	Back	Positive	Negative	Positive	Negative
	Gills	Negative	Negative	Negative	Negative
15	Back	Positive	Positive	Positive	Negative
	Gills	Positive	Negative	Negative	Negative
25	Back	Positive	Positive	Positive	Positive
	Gills	Positive	Negative	Negative	Negative
30	Back	Positive	Positive	Positive	Positive
	Gills	Positive	Positive	Positive	Positive
40	Back	Positive	Negative	Positive	Negative
	Gills	Positive	Negative	Positive	Negative
50	Back	Positive	Negative	Positive	Negative
	Gills	Positive	Positive	Positive	Positive
75	Back	Positive	Positive	Positive	Positive
	Gills	Positive	Positive	Positive	Positive
100	Back	Positive	Positive	Positive	Positive
	Gills	Positive	Positive	Positive	Positive

A similar survey was made during a commercial operation in another manner by swabbing surfaces exactly 100 sq. cm. in area of skin, fillet, conveyor, table, etc., and placing swab in 11 c.c. of 0.8 per cent saline solution in sampling bottles which are packed in ice and diluted and poured 2 to 5 hours later. The results are the average of 7 to 10 swabs for each test and are given in count per 100 sq. cm.: (1) whole fish just before scaling, 60,620; (2) whole fish just after scaling, 55,750; (3) whole fish on belt after spraying scales off, 61,780; (4) fillets after skinning, 67,610; (5) fillets after belt travel to brine, 73,830; (6) fillets just after brining in 2 p.p.m. chlorine and 20 per cent salt for 7 seconds, 61,595; (7) fillets in pan after weighing, 92,200; (8) wrapped fillets, 151,800. It is obvious that the count takes a decided jump when handled, and that the packers and weighing and wrapping facilities may undo an otherwise excellent job if overlooked as a source of contamination.

BACTERIOLOGICAL STANDARDS FOR PRODUCTION

A total count of 100,000 on the frozen fillet after 48 hours' storage is considered feasible to set as the practical maximum, and whenever the count on the daily sample exceeds this amount it is usually held in 0° F. storage until it is reduced to this amount. Thus the housewife should always receive fish which will remain fresh for a relatively long time after defrosting. The brine tank is a critical piece of equipment. Small pieces of fish absorb the chlorine and decrease its effectiveness and it may become a cesspool of contamination. In heavy production an endeavor is made to maintain 5–7 p.p.m. of residual chlorine. It is estimated that 2–3 p.p.m. would be sufficient, however, to keep the brine sterile if an automatic chlorinator control is accompanied by efficient filtration of the brine. Since the fish can remain in the brine only 10–20 seconds no real disinfection is possible. In fact it is not feasible to allow the fillets to remain long in contact with chlorine because of the undesirable yellow color and salt fishy flavor that develops subsequently during frozen storage.

SIGNIFICANCE OF THE DATA

Griffiths and Fuller[3] found *E. coli* in practically all fish fillets in the open market. Table V indicates how difficult it may be to keep such contamination out of the plant. The source of course is the men on the boats, the wharves, and in the plants, fortunately a very healthy race of men. All fish except oysters and quahaugs are cooked before being eaten. Therefore the presence of *E. coli* in fish fillets loses much of its significance. The total count must be kept down as a low count means continuous satisfaction while high counts very markedly shorten the period of edibility after defrosting.

The use of chlorine is of even greater significance in the packing of cooked shellfish meats such as lobster and crab. The secret of success is to sterilize the meat during the cooking process and thereafter prevent contamination. This is very difficult in practice because the incoming material must be kept strictly separated from the cooked material and the utensils used for handling it. The workers must continually dip their hands, knives and utensils into chlorinated water. It is almost necessary to build a plant of special design to suit such requirements. Our control of quality in shellfish will be the subject of a subsequent paper.

REFERENCES

1. Stansby, M. E., and Lemon, J. M. An Electrometric Method for Detection of Relative Freshness of Haddock. *Indust. & Eng. Chem.*, Anal. Ed., 5, 208 (May), 1933.
2. Birdseye, Clarence. Sanitary Measures in a Fish Dressing Plant. *Indust. & Eng. Chem.*, 21, 854 (Sept.), 1929.
3. Griffiths, F. P., and Fuller, J. E. Detection and Significance of *Escherichia coli* in Commercial Fish and Fillets. *A.J.P.H.*, 26:260, 1936.

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Food Poisoning

DURING recent years the number of organisms proved to be capable of giving rise to food poisoning in one or other of its forms has greatly increased. Since the isolation of *B. enteritidis* by Gaertner in 1888, followed 10 years later by the isolation of *B. aertrycke*, or *Bact. typhi-murium* as this organism is now called, by Durham in England and de Nobele in Belgium, both organisms being undoubtedly responsible for cases of food poisoning, at least 27 members of the Salmonella group have been identified with actual outbreaks of food poisoning in human beings. . . .

As has been indicated the Salmonella group consists of a large number of organisms and new types are continually being added to the list, but the commonest type in food poisoning outbreaks is undoubtedly *Bact. typhi-murium* (*B. aertrycke*). During the years 1923–1933, the Ministry of Health found this organism in 110 out of 186 food poisoning outbreaks, in 22 out of 43 in 1934, and of the 46 outbreaks which occurred in 1935 in which the causative organisms were actually isolated, 29 were due to *Bact. typhi-murium*. The next most frequently isolated is *Bact. enteritidis*. These facts are rather significant and are of some importance when the cause of outbreaks comes under investigation.—E. R. Jones, M.D., D.P.H., F.I.C., Senior Pathologist, Kent County Council. *J. State Med.*, July, 1937.

International Coöperation in Hygiene*

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THERE can be no quarrel with the statement that public health is advancing. Signs and symptoms of its progress appear on every side. But progress is a relative term, and it is pertinent to ask whether public health is keeping abreast of the march of science on the one hand and the changing needs and conditions of life on the other. For public health is no abstraction, being intimately related to the life of the people and the world in which they live and move. Measured in absolute terms, international cooperation in hygiene has advanced rapidly in the last two decades. In comparison with world progress, with the march of civilization, the rapidity of its advance is seen to leave something to be desired. For we are living in a world which is shrinking visibly and steadily, year by year and day by day. It is primarily a physical shrinking bringing points which were once distant nearer and nearer together and making neighbors of once remote peoples. The secret places of the earth are yielding up their mysteries to the machine. There is now a settlement at the North Pole; airplanes have flown over Mt. Everest; the desert has yielded up its secrets to tractors.

Within a few months the countries of Europe will be almost as near to us as California—the regular service of seaplanes across the Pacific has brought the East to our very doorstep. Those of us who can remember the turn of the century appreciate that we are living in a world which has been, and still continues to be, radically transformed by the ever increasing speed of travel and communication. This world physical shrinkage has brought in its train many by-products. Isolation is no longer possible anywhere. Eternal vigilance must be exercised to prevent the spread of disease. No human vigilance can prevent the spread of ideas which, reaching from country to country and from continent to continent, have transformed the world of thought. Ideologies which a few years ago would suffuse only slowly through national frontiers now leap such obstacles with the speed of light. The members of the human family are having the fact of their close relationship forced on them every day.

WIDENING OF THE INTELLECTUAL HORIZON

At the same time that the physical world is shrinking, the intellectual world is enlarging. The exploration of nature is adding new facts to our store faster than we can assimilate them. Busily engaged in digesting those facts, we have little time and less ability to add them together and to examine the product. While the pressure of new knowledge is forcing us to alter many of our conceptions of the world about us, we yield up our old ideas, prejudices,

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and opinions but slowly. This is particularly true in the field of international relations, where the old idea that every nation is the antagonist of every other nation and that the citizens of any given nation are so superior to the citizens of any other nation that they must at all costs multiply and inhabit the earth, by fair means or foul, usually the latter, is still the predominating national doctrine. A few leaders, like our own Secretary of State, speak convincingly of the need for international harmony in economics, politics, and social affairs. Their voices are in danger of being drowned by the rattle of the machine gun, the bursting of bombs from the sky, and the explosion of mines.

GROWING COMPLEXITY OF THE MODERN WORLD

A third phenomenon is the increasing complexity of the New World in which we live, and the fact that we still behave very much as if we lived in the last century. I have already spoken of the spread of ideas, many of which are regarded as patriotic in one country and subversive in another. But the complexity of the world is due mainly to the increasingly dense network of social, economic, and political interrelationships which caused the murder of an archduke in far away Sarajevo to bring on a war which affected every single inhabitant of the globe. Almost no human action is without its remote repercussions.

GROWTH OF INTERNATIONAL COÖPERATION INEVITABLE

The lessening size of the world and the increasing complexity of life led inevitably to the growth of international coöperation of which coöperation in hygiene is only a part. Commerce has forced the nations to cooperate in finance and economics, and in weights and measures. Science, industry, and other forces have compelled them to coöperate in other fields. They have been reluctant to coöperate. They have prized their isolation. They have wished to remain independent to retain their sovereignty unimpaired. Some of the so-called most enlightened governments fought international cooperation to the last ditch—some are still fighting it, as Don Quixote fought windmills. But the hard facts of the machine age and the industrial revolution cannot be denied. Coöperate or perish are the two horns of the dilemma. There is no alternative, no other path of escape.

I believe that the world today is turning, perhaps very slowly, toward the alternative of coöperation. The progress of international coöperation in health matters illustrates the trend in that direction.

LIST OF INTERNATIONAL HEALTH ORGANIZATIONS

In 1910 there were no official international health organizations in existence. What is the situation today? Every American knows that there is a Pan American Sanitary Bureau which facilitates the coöperation of American countries in health matters. The prevalence of yellow fever and plague on the American continents, and the multiplying facilities for their spread from one country to another prove the need for such coöperation. But the Bureau is reaching into a wider field, and little in the modern health program is foreign to it. An international maritime and quarantine board at Alexandria stands guard over the Suez Canal and supervises the Mecca pilgrimage in the interests of disease prevention. The International Austral-Pacific Bureau at Melbourne assists health departments in that region to coöperate in disease prevention and health promotion. The International Public Health Office at Paris is perhaps the

most important organization of its type; it is independent and specialized, not forming part of any larger organization, and restricting itself to the preparation and application of international conventions having for their purpose the prevention of the spread of disease. More than fifty-five governments adhere to the Rome agreement by which it was created, and it cooperates with the other international health organizations which I mention in this report.

Still another international organization concerned with health is the International Labour Office. While the object of the League is to prevent war between the nations, the aim of the International Labour Office, of which this government is a member, is to prevent war between the social classes by measures to improve the health, safety, and economic security of the wage earners in all countries. For the absence of international agreement on such measures, leads inevitably to ailing industry, low wages, violence, and strikes. The situation in the textile industry is a striking illustration of what happens when there has been no such international agreement. The International Labour Office is concerned with industrial hygiene, occupational diseases, housing, maternal and child welfare, medical care, and many other subjects in the field of health. Workers and their families constitute the largest single element in any population, which gives great importance to the work of this organization. In the field of health it coöperates closely with the League.

HEALTH WORK OF THE LEAGUE

The two international health organizations which I propose to describe in somewhat greater detail owe their existence to the League of Nations by which they are controlled and financed. They have opened up new avenues of coöperation between the nations, and during their relatively short existence they have grown steadily in importance and prestige.

The first of these is the International Health Organization at Geneva, which forms an integral part of the League of Nations structure. Founded almost as soon as the League itself took form, it has taken the whole world for its territory, finding that international health coöperation could not be restricted to the fifty-nine governments which have adhered to the League Covenant. Important non-League members, like the United States, Germany, and Japan, coöperate with this organization. It is natural that this should be so for in the prevention of disease and the promotion of health it is impossible to restrict action to countries which belong to the League.

The other organization is really a part of the first as its name denotes—it is the Eastern Bureau of the League's Health Organization at Singapore. These two organizations have made history in the field of international relations. They have helped to clear a pathway along which governments may proceed in other fields, for in international as in national affairs, public health administration is intimately related to administration in general. The lesson that the complexity of the modern world has increased the interdependence not only of governments, but also of every function of a single government, is being pressed home steadily at Geneva.

PROGRESS IN INTERNATIONAL HYGIENE

What progress in world public health stands to the credit of these two international health organizations?

In the first place they have been a tremendous help in the efforts of governments to prevent the spread of the major epidemic diseases. This is per-

haps best illustrated by the service of epidemiological intelligence established at Singapore. All the important national health administrations in the Far East report to Singapore by the most rapid means, usually the cable, the movement and prevalence of plague, cholera, dysentery, smallpox, and typhus fever in their ports and within their borders. Singapore in turn digests and assembles this material and broadcasts it from ten wireless stations at daily and weekly intervals so that every health officer in that wide area may take action based on the most recent and accurate reports.

Those who are interested in this service should read recent League bulletins on the march of cholera in the Shanghai, Hong Kong, and Swaton area, a painful reminder that our success in preventing great epidemics is restricted to periods of peace between the nations.

Coördination of research in preventive medicine has been one of the outstanding successes of the League. I need mention only a few examples. Some thirty preparations widely used in medicine are now subject to international standardization. The stable standard preparations are preserved by national institutes at London and Copenhagen on behalf of the League. Samples of these standards are sent out periodically to national health administrations, and samples of national standards are examined routinely at London and Copenhagen to see how closely they conform to the international standard. The list includes such sera as diphtheria antitoxin and dysentery serum, such vaccines as tuberculin, organ extracts such as insulin, pituitary, adrenalin, pharmaceutical products like digitalis and strophanthus. Four of the vitamins are included in the list, demonstrating that progress in medicine has not been allowed to outpace the international machinery for the coördination of the results of medical research.

Such coördination has been extended to other fields. Several groups of malariologists in a number of countries are studying the effects of the new synthetic remedies used in the treatment and prophylaxis of malaria according to a plan carefully worked out by a League committee. Recently there met at Geneva for the first time a group comprising all those who had made any contribution to the prevention of typhus fever and, if time permitted, I could give you many more examples of this attempt to coördinate the results of national research in the field of preventive medicine.

International health organizations use various means to accomplish their ends. The preparation, adoption and ratification of a convention is the traditional method. But as international coöperation in this field has progressed, less formal means have become more and more important. In the first place among these are measures to promote the exchange of national experience and information on as wide a scale as possible. Recognition of the important part played by this exchange has led to the organization of specific means to promote it. As far as the League is concerned, it has facilitated the studies abroad of more than seven hundred public health officers. Many of you have felt the influence of this system. In 1935 and 1936 groups of European and Latin-American public health officers visited this country under the auspices of the League. They learned much from you. Would it be wrong to claim that they also gave much to their American hosts? The impressions of the first group have been set out in a report which some of you have seen, *Public Health and Social Problems in the United States of America*. The report of the second group, on the teaching

of hygiene in this country, will shortly be considered by a commission comprising the directors of most of the important schools of hygiene in the world. I am sure that the report of that commission, based as it will be on detailed studies of European and American schools, will be a real contribution to the subject.

The real task of an international health organization is not so much to carry out direct work as it is to provide opportunities for the national health administrations to coöperate among themselves. The Singapore Bureau of the League permits the governments to exchange timely information on the prevalence of disease. Health officers from other countries are given the opportunity to study in detail the effective campaign waged against syphilis in Denmark and Sweden. Any government which wishes to do so may take advantage of the facilities available at the International Leprosy Research Center at Rio de Janeiro. And when a government desires to reorganize or reform its health administration it may, through the League, obtain the disinterested advice and assistance of the best public health and medical experts from other countries.

Greece and China are among the countries which have availed themselves of that opportunity, and while the splendid results obtained in China are due primarily and essentially to the Chinese, they would be the first to acknowledge their indebtedness to the wise counsel of League experts who spent months studying the local conditions and deliberating with their Chinese colleagues on the most suitable plans and policies.

One result of their deliberations was the request for League assistance in the whole field of national reconstruction, general education, economics, finance, transport, agriculture, etc. They realized that the various elements in national economy and reconstruction are interdependent—one activity cannot progress normally while another lags. It is a lesson which many others need to learn.

The recent international campaign for better nutrition is a sign that the League itself has learned that lesson. At first the different League organs carried on their work as though their problems formed entities, separate from and independent of all other problems. When the problem of better nutrition was finally tackled, this isolation of specialists soon went by the board, as the complexity of the problem became evident. For the success of a policy to improve nutrition depends upon agriculture, transport, wages, tariff barriers, import quotas, exchange restrictions, national security, and armament policy just as it depends upon the efforts of public health specialists.

One by-product of international cooperation in hygiene has been the broadening of our conception of the public health field. By accident or tradition, public health or preventive medicine means one thing in one country and something else in another. Health authorities in this country pay little attention to housing, which is the most engrossing task of the English Ministry of Health. Provision for medical care is considered fundamental by one national health administration while another makes no attempt to deal with it. Improvement of physical education is a chief plank in the public health platform of one country while in another it is completely ignored. I do not ask that we in this country should broaden our program to include all subjects which are comprised in the public health policy of other countries. But I do believe that the existing agencies for international coöperation give us an opportunity to study those policies as they are prac-

tised and, if advisable, to adapt and readjust our own programs.

I have been closely associated with the League for 12 years and I firmly believe in its covenant, in its work, and in its methods. Only human frailty stands in the way of its immediate success. I believe that the triumph of League principles will ultimately solve the world's most serious problems. Holding firmly to that belief, I consider it the duty of every right thinking person to help on the cause of international coöperation in his own field of work. International coöperation in hygiene has paved the way for coöperation in economics, finance, and even in politics. Those of us who are concerned in health work can do our share by giving every encouragement to existing international health agencies. We have much to learn from their publications, and where possible from active participation in their work. The best contribution we can make is to bring our own work to the highest possible level, so that it may serve as an example to others.

By an intensive campaign against syphilis Denmark and Sweden have furnished a striking example of what can be accomplished against that disease. Our own Surgeon General has brought the lesson home to this nation. And America has contributed much to world public health progress by precept and example. American specialists have sat on nearly every important international committee concerned with health, and have made fundamental contributions to their work.

Every student of world affairs or even of national affairs realizes that one of the chief problems of the day is to raise the level of the standard of living throughout the nation and throughout the world. Social unrest in any country is a danger to peace.

The League, the International Labour Office, and many of the other international organizations are engaged in the task of improving health, largely by means calculated to achieve that object. For the safety of the world against aggression lies not so much in disarmament and the negotiation of treaties; it is based upon more fundamental considerations such as social security, sound economics, good health, and comfortable and healthful living conditions. In the endeavor to bring about these reforms, the members of this Association have an important part to play without going out of their own field which is the promotion of health. In so doing they will have the satisfaction of knowing that they are contributing to the progress of mankind along the road to peace.

Relationship of the Diet to the Self-Regulatory Defence Mechanism*

II. Lysozyme in Vitamin A and in Uronic Acid Deficiencies

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MANY factors contribute to the self-regulatory defence mechanism of the gastrointestinal tract. The authors have shown in the preceding paper of this series changes which occur in the bacterial flora and pH of the intestinal contents of rabbits fed on diets containing dehydrated apple.

In this report, we wish to present data showing the effect of dehydrated apple on the lysozyme content of the tissues and secretions of rabbits on vitamin A deficient diets and rabbits depleted of their reserve of uronic acids.

The rôle lysozyme plays as a defence mechanism of the eye [7, 8, 10] has been very thoroughly investigated. Since lysozyme is found in practically all secretions of the mucous membrane, we believe that it may be a factor of great importance in the intestinal self-regulatory mechanism.

HISTORICAL

Lysozyme was first described by Fleming [1] who found that tears had the property of dissolving or lysing organisms isolated from the air. Later Fleming and Allison [2] reported finding this same lytic agent in practically all human tissues and secretions except cerebrospinal fluid, normal urine and sweat. They concluded that lysozyme was especially active against non-pathogenic organisms and that this was the reason these organisms were non-pathogenic. Later workers, however, found that while lysozyme did not always cause lysis of pathogenic organisms, it did in many cases act as a bactericidal or bacteriostatic agent. In fact, few if any pathogenic organisms are totally unaffected when brought in contact with lysozyme. Fleming believes that lysozyme is the body's only natural defence mechanism and that immunity is acquired through its help.

Findlay [14] and Anderson [15] found that in both animals and humans deficient in vitamin A there is a diminished lysozyme content of the tears. They also found that the xerophthalmia present could be cured by local treatment with lysozyme.

Ridley [6] found that in epiphora there

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was a lowering in lysozyme titer and that following this lowering, infection in the affected eye could occur.

Hilding [12] determined the lysozyme content of nasal mucus and found that there was a loss in lytic power preceding a cold and during its course. An increase in lytic power was found to precede improvement in symptoms.

Wolff [3, 4] and Kigasawa [5] and Meyer, Thompson, Palmer and Kharazo [18] produced purified lysozyme from egg white and investigated its chemical properties. They concluded that lysis cannot be explained on a physical basis, *e.g.*, lowering of surface tension. Lysozyme has no protease, kinase, amylase, lipase, or phosphatase activity. It liberates reducing sugars from mucoids or polysaccharides of susceptible organisms. Lysozyme is apparently a basic polypeptide whose optimum activity is at a neutral pH. It is destroyed by heat and retained by filters.

Rosenthal and Lieberman [9] found that infants fed cow's milk did not have lysozyme in their stools. Infants fed breast milk did, however, have lysozyme in their stools. They also found that lysozyme inhibited the growth of *Esch. coli* but not *B. bifidus*. Human milk contains lysozyme while cow's milk does not. Blatt and Kessler [16] have since confirmed their findings.

Goldsworthy and Florey [13] determined the lysozyme content of the tissues and secretions of various animals. They found that the rabbit has a high lysozyme content in mucus from the colon. Cat tissue is poor in lysozyme, but the saliva is very high. Goats, however, had no lysozyme in saliva but a great deal in tears. Since our work began, Prickett, Miller, and McDonald [23] reported finding an increase in lysozyme in tissues of rats on a vitamin A deficient diet.

There has recently been published a symposium on lysozyme by Melnik, of the Ukrainian Metchnikoff Institute.[17] These workers found lysozyme to be active in varying degrees against practically all pathogenic organisms. They also found that organisms lysed served as immunizing antigens as well as if killed by other means. In some cases the lysed organisms served as better antigens than those killed by heat.

EXPERIMENTAL

Rabbits were used as the experimental animals and were divided into 6 experimental groups, namely (N) pellet diet, (A) pellet diet plus dehydrated apple,* (AD) vitamin A deficient diet, (AAD) vitamin A deficient diet plus dehydrated apple, (M) rolled oats plus vitamins plus menthol (3 gm. per kg. of body weight daily), and (MA) rolled oats plus vitamins plus menthol (3 gm. per kg. of body weight daily) plus dehydrated apple (20 gm. daily). Lysozyme determinations were made of the tissues at the 5 different levels of the intestinal tract previously investigated for hydrogen-ion concentration and bacterial flora, namely, duodenum, jejunum, ileum, cecum and colon.

The test organism used was a Sarcina obtained from Dr. Richard Thompson and found by him to be an excellent indicator of lysozyme activity. The method used for testing the lysozyme content of the tissues is as follows: The animal is killed by a blow and tissues immediately removed and placed in absolute acetone. After remaining in acetone 48 hours, the tissues were removed to a desiccator until thoroughly dry and then ground to a powder. This powder was then

* The dehydrated apple was in the form of a powder as originally prepared in this laboratory and described in earlier publications. A complete description of the diets used occurs in the first paper of this series.

TABLE I

Average Lysozyme Titration for (N) Normal Group (6 Rabbits)

1 Hour Incubation

Level	*No Lysis*	*25% Lysis*	*50% Lysis*	*75% Lysis*	*100% Lysis*
1. Duodenum	1:66	1:33	.....	....	None
2. Jejunum	1:66	1:33	.....	....	None
3. Ileum	1:91	1:41	.....	....	None
4. Cecum	1:250	1:150	1:100	1:55	1:4
5. Colon	1:5,700	1:3,200	1:1,200	1:750	1:300

TABLE II

18 Hour Incubation

Level	*No Lysis*	*25% Lysis*	*50% Lysis*	*75% Lysis*	*100% Lysis*
1. Duodenum	1:83	1:41	.....	.....	None
2. Jejunum	1:83	1:41	.....	.....	None
3. Ileum	1:110	1:50	.....	.....	None
4. Cecum	1:500	1:400	1:300	1:200	1:17
5. Colon	1:19,000	1:15,700	1:12,000	1:8,000	1:3,200

weighed and extracted with physiological saline for 24 hours. Progressive dilutions of this extract were put in serological tubes in 0.5 c.c. amounts and mixed with 0.5 c.c. of a saline suspension of the test organisms. The mixtures were incubated at 37° C. for 18 to 20 hours and the degree of lysis read, the titer being the highest dilution giving complete lysis.

The lysozyme titer of the gastrointestinal tract of the rabbits in group N was taken as the normal titer. The lysozyme titration was then obtained with the rabbit group (A) receiving dehydrated apple added to basic pellet diet. The purpose of this was to determine if apple caused any change in normal titer. Table I and II show the average titrations for the normal group with 1 hour and 18 hour incubations. The animals in group A gave titers identical with the normal. In order to avoid duplication the data are not given.

It will be noted that of all the levels studied, the colon contained the greatest amount of lysozyme. Because of this, the colon was considered the best indicator of lysozyme concentration and in the following experiments was the only tissue used.

VITAMIN A DEFICIENCY

Two groups of rabbits were fed a vitamin A free diet. One group received in addition dehydrated apple *ad lib.* After the A deficient group showed signs of severe depletion, the animals in both groups were killed and the lysozyme content of the colon was determined.

TABLE III

Average Lysozyme Titration of Colon of 6 Rabbits Fed Vitamin A Deficient Diets

	Lysozyme Titer of Colon	
Group	*Complete Lysis*	*No Lysis*
AD	1:7,170	1:32,000
AAD	1:3,300	1:19,000

Table III shows the comparative lysozyme titers of the two groups. The group receiving dehydrated apple had a normal amount of lysozyme in the colon, while the group not receiving dehydrated apple had over twice as much lysozyme in its colon tissue. The vitamin A deficient rabbits showed

severe ulcerations of stomach, intestine, and gall bladder, and the liver had many whitish areas. The group receiving the dehydrated apple supplement exhibited no gross pathology. The tissues of both groups were preserved for tissue section and will be reported at another time.

URONIC ACID DEPLETION

Manville, Bradway, and McMinis [25] in reporting the use of pectin as a detoxication mechanism found that animals fed menthol could be protected by the ingestion of pectin. They concluded that the uronic acid present in pectin conjugated with menthol thus sparing endogenous sources of uronic acids such as mucin, chondroitin, heparin, etc. The rabbits fed pectin showed less protein breakdown than the group not receiving pectin.

Since the dehydrated apple used contained a large amount of pectin (5.22 per cent) it was thought advisable to repeat the menthol feeding experiments, using the dehydrated apple as a source of uronic acid. The colons of rabbits fed menthol and menthol plus apple were taken for lysozyme determination. Each group received 3 gm. of menthol per kg. of body weight daily. In addition, one group received 20 gm. of dehydrated apple daily. Within 8 to 12 days, all of the animals not receiving apple were dead. Immediately after death, the colons were taken for lysozyme determinations. After the last animal of the group receiving menthol only was dead, all of the animals in the group receiving menthol plus apple were killed. The group receiving the menthol supplement only showed severe ulcerations of stomach, intestine, and gall bladder, with many whitish areas in the liver. These lesions appeared to be identical to those occurring in the vitamin A deficient rabbits. This is in further confirmation of statements made elsewhere.[24] The group receiving menthol plus apple showed no gross pathology. Tissues were taken for sectioning and will be reported upon at a later time.

In Table IV it will be seen that the lysozyme content of the colons of the animals in group M was almost 4 times the normal, while the lysozyme titer of group MA was normal.

TABLE IV

Average Lysozyme Titration of Colon of 6 Rabbits Fed Menthol

	Lysozyme Titer of Colon	
Group	*Complete Lysis*	*No Lysis*
M	1:12,800	1:40 000
MA	1:3,300	1:20,000

EFFECT OF MUCUS SECRETION ON TISSUE LYSOZYME

Prickett, Miller, and McDonald [23] found that rats fed a diet deficient in vitamin A had an *increase* in lysozyme in the *tissues*. They concluded that this was an attempt to compensate for the deficiency. Furthermore, other workers have found that a vitamin A deficiency *decreases* the amount of lysozyme in *secretions*. Manville believes that there is a relationship between vitamin A and uronic acid metabolism and that a deficiency of either will result in a reduction of mucus secretion. Lysozyme is secreted in mucus and mucus secretion is deficient or absent in vitamin A deficiency and in menthol poisoning. The reason then that lysozyme is higher in the tissues in these conditions may be due to the inability of the body to provide mucus to act as a vehicle of transport for lysozyme. In other words, vitamin A and uronic acid may act as a trigger mechanism in lysozyme secretion. To test this possibility 6 animal groups were used, namely: group NP receiving a pellet diet; group A receiving pellets plus dehydrated apple; group AD receiving vitamin A deficient diet; group

AAD receiving vitamin A deficient diet plus dehydrated apple; group M, receiving 3 gm. of menthol per kg. of body weight daily; and group AM, receiving 3 gm. of menthol per kg. of body weight and 20 gm. of dehydrated apple daily. When the animals were ready for lysozyme determinations, the following procedure was used: the animal was anesthetized with intravenous nembutal, the abdomen opened, and half the colon removed. Immediately after this, 2 mg. of pilocarpine per kg. of body weight was given intravenously. This was allowed to act for 30 minutes and the rest of the colon removed. Both sections of the colon were then tested for lysozyme content. Table V shows the result of these determinations. Those groups which were vitamin A deficient or depleted of their store of uronic acids showed a much smaller loss of tissue lysozyme than those groups fed apple. The normal control group showed the same percentage loss as the groups fed apple.

DISCUSSION

In the self-regulatory defence mechanism no one factor alone can be considered. Arnold,[28, 29] Nedzel and Arnold,[30] Johnson and Arnold,[31] Seidman and Arnold,[32] Arnold,[33] and Bergeim, Hanzen, and Arnold[34] have all shown that this defence mechanism is very closely linked with hydrochloric acid secretion in the stomach and its buffering action in the intestine. They have further shown that the ingestion of certain fruits protect the body from both exogenous and endogenous bacteria, their explanation being that probably this protection comes from

TABLE V

Lysozyme Titrations on Colons of Rabbits Before and After Receiving Pilocarpine

Diet	*Group Number*	*Lysozyme of Colon Before Pilocarpine*	*Lysozyme of Colon After Pilocarpine*	*Per cent Loss of Lysozyme*
Pellet Diet	NP-1	1:3,300	1:1,400	57.6
	NP-2	1:3,200	1:1,500	53.2
	NP-3	1:3,200	1:1,400	56.3
	NP-4	1:3,400	1:1,200	64.8
Pellet Diet	A-5	1:3,500	1:1,400	60.0
plus	A-1	1:3,200	1:1,300	59.4
Apple Powder	A-6	1:3,400	1:1,200	64.8
	A-7	1:3,200	1:1,100	67.6
Vitamin A	AD-7	1:7,500	1:7,000	6.7
Deficient	AD-8	1:8,000	1:7,500	7.3
Diet	AD-9	1:6,000	1:5,000	16.7
	AD-10	1:7,500	1:6,800	9.4
Vitamin A	AAD-1	1:3,200	1:1,200	62.6
Deficient	AAD-2	1:3,400	1:1,100	67.7
Diet Plus	AAD-3	1:3,200	1:1,000	68.8
Apple Powder	AAD-4	1:3,500	1:1,400	60.0
Menthol Fed	M-1	1:10,200	1:8,800	13.8
3 grams per	M-4	1:11,600	1:10,800	7.9
kilogram daily	M-5	1:9,800	1:8,000	17.4
	M-6	1:12,000	1:11,200	6.7
Menthol Fed	AM-1	1:3,400	1:1,400	58.9
3 gm./kilo. daily	AM-2	1:3,200	1:1,500	53.2
plus Apple Powder	AM-3	1:3,200	1:1,600	50.0
20 gm. daily	AM-4	1:3,300	1:1,200	63.7

the organic acids present in the fruit being toxic to harmful organisms. Furthermore, the carbohydrates present promote the growth of a favorable flora. The authors [35] have confirmed these findings in rabbits fed apple in which the pH and bacterial flora determinations of the gastrointestinal tract were made. Arnold and his coworkers have also shown that the stomach and upper levels of the intestinal tract are relatively free of bacteria, probably due to the bacteriostatic action of the hydrochloric acid, while the lower levels have a great bacterial population. Our finding in the lysozyme content of the tissues of the gastrointestinal tract shows that at those levels thus protected the lysozyme content is low. Furthermore, in the lower levels where the acid protection is gone we found the tissue lysozyme to be high. We think it is logical to assume that where one protective mechanism leaves off another takes its place. The mucous membrane of the colon is constantly bathed in mucus high in lysozyme, thus protecting the tissue from bacterial invasion. If for any reason this mucus supply is lowered the lysozyme is also lowered. This condition we found to be true in animals deficient in vitamin A or uronic acid. It is of interest to note that animals so deficient exhibited severe ulcerations of the gastrointestinal tract. We think it reasonable to assume that the body needs these two substances to promote mucous metabolism, the mucus being the vehicle for lysozyme. It would seem that the lysozyme, to be effective as a defence mechanism in the colon, must be in the mucus bathing the surface cells. The increased lysozyme content of the colon tissues in animals deficient in vitamin A and uronic acids is probably due to the tissue continuing the manufacture of lysozyme although being unable to transport it. Lysozyme retained in the tissue is probably inactive, thus allowing a bacterial invasion of these tissues.

The animals receiving diets deficient in vitamin A and uronic acids that were fed supplements of dehydrated apple showed a normal lysozyme concentration in their colon tissues. The normality of these animals cannot be accounted for on the basis of vitamin A alone, as shown by Manville, McMinis, and Chuinard.[26] The dehydrated apple does not contain a large amount of vitamin A, but it is rich in uronic acids. Manville [24] has pointed out the possibility of the uronic acids supplementing vitamin A in mucous metabolism. Evidence that this is true is supported by the similarity in the gross pathological lesions and tissue lysozyme titers of our experimental animals.

Thus there is shown to be an additional self-regulatory defence mechanism with its chief site of operation in the colon. Hydrochloric acid is effective in the upper reaches of the gastrointestinal tract, but the organic acids and lysozyme must be depended upon in the lower levels. Foods, such as the apple, either in the fresh or dehydrated state, are quite essential in the maintenance of this activity.

It is noteworthy that by the time the food residues have reached the lower levels of the intestine, most of the protective influences operative at the higher levels have been removed and the material itself has been converted to its most irritative form. Mucus secreting elements are more richly supplied in the colon than elsewhere. These are stimulated into activity by the mechanical irritation of the intestinal contents. Mucus not only acts as a lubricant and a mechanical buffer but acts as well as a vehicle of transport for lysozyme. May it be that the chain of events characterizing the "irritable colon,"

mucous colitis and ulcerative colitis represent, fundamentally, overstimulation of mucus production with a resultant depletion or exhaustion in lysozyme output?

SUMMARY AND CONCLUSIONS

Lysozyme content of the tissues of 5 levels of the intestinal tract was determined. This showed that in the rabbit, the colon contained many times more lysozyme than the other levels.

The lysozyme titer of the colon apparently cannot be increased beyond normal levels by the feeding of dehydrated apple supplement.

Vitamin A deficient and uronic acid deficient rabbits showed a tissue lysozyme concentration 2 to 4 times greater than normal.

Vitamin A deficient and uronic acid deficient rabbits fed an apple supplement showed a tissue lysozyme concentration that was normal.

Normal rabbits, rabbits fed apple supplement, rabbits fed on a vitamin A deficient diet plus apple, and rabbits depleted of uronic acid but fed an apple supplement when stimulated by pilocarpine lost by mucus secretion over 50 per cent of their tissue lysozyme.

Rabbits fed a vitamin A deficient diet and rabbits depleted of their uronic acids when stimulated by pilocarpine lost by mucus secretion only 6 to 17 per cent of their tissue lysozyme.

Because of these findings, we believe that vitamin A and uronic acids act as trigger mechanisms in the secretion of lysozyme in mucus. Animals deficient in these two factors can still produce lysozyme in their tissue but are unable to utilize it as a defence mechanism.

REFERENCES

1. Fleming, A. A Bacteriolytic Substance (Lysozyme). *Proc. Roy. Soc. Med.*, Ser. B, 93:306, 1922.
2. Fleming, A., and Allison, V. D. A Bacteriolytic Substance (Lysozyme). *Brit. J. Exper. Path.*, 3:252, 1922.
3. Wolff, L. K. Untersuchungen Über das Lysozym. *Ztschr. f. Immunitätsforsch. u. exper. Therap.*, 50:88, 1927.
4. *Ibid.* 54:188, 1927.
5. Kigasawa, T. Lysozymwirkungen des Eiereiweiss. *Ztschr. f. Immunitätsforsch. u. exper. Therap.*, 54:155, 1927.
6. Ridley, F. Lysozyme. *Proc. Roy. Soc. Med.*, 21:1495, 1928.
7. Fleming, A. Lysozyme: A Bacteriolytic Ferment Found Normally in Tissues and Secretions. *Lancet*, 1:217, 1929.
8. Florey, H. The Relative Amounts of Lysozyme Present in the Tissues of Some Mammals. *Brit. J. Exper. Path.*, 11:251, 1930.
9. Rosenthal, L., and Lieberman. The Rôle of Lysozyme in the Development of the Intestinal Flora of the New Born Infant. *J. Infect. Dis.*, 48:226, 1931.
10. James, W. M. The Lysozyme Content of Tears. *Am. J. Ophth.*, 18:1109, 1935.
11. Meyer, K., Thompson, R., Palmer, J. W., and Kharazo, D. The Nature of Lysozyme Action. *Science*, 70:61, 1934.
12. Hilding, A. Changes in the Lysozyme Content of the Nasal Mucus During Colds. *Arch. Otolaryng.*, 20:38, 1934.
13. Goldsworthy, N. E., and Florey, H. Some Properties of Mucus with Special Reference to Its Antibacterial Function. *Brit. J. Exper. Path.*, 11:192, 1930.
14. Findlay, G. M. A Contribution to the Aetiology of Experimental Keratomalacia. *Brit. J. Exper. Path.*, 6:16, 1925.
15. Anderson, O. Über die Verhältnisse des Lysozyms bei Xerophthalmie. *Acta Paediat.*, 14:81, 1932.
16. Blatt, M. L., and Kessler, H. Human Milk: Its Lysozyme Content and Bacterial Count. *Am. J. Dis. Child.*, 53:768, 1937.
17. Lysozyme, Typhoid Fever, Diphtheria, Rheumatism. Symposium of Metchnikoff Institute. *Imprimé en U.R.S.S.*
18. Meyer, K., Thompson, R., Palmer, J. W., and Kharazo, D. The Purification and Properties of Lysozyme. *J. Biol. Chem.*, 113:303, 1936.
19. *Ibid.* 113:479, 1936.
20. Bradford, W. L., and Roberts, J. B. The Lysozyme Content of Blood. *J. Pediat.*, 8:24, 1936.
21. Roberts, E. A. H. The Preparation and Properties of Purified Egg White Lysozyme. *Quar. J. Exper. Physiol.*, 27:89, 1937.
22. Pinner, Max, and Voldrich, Marie. The Occurrence of an Apparently Sterile Phase; The Relation of Lysis to Dissociation (Lysozyme). *J. Infect. Dis.*, 60:6, 1937.
23. Prickett, P. S., Miller, N. J., and McDonald, F. G. Lysozyme Studies of Tissues from Animals Deficient in Vitamin A. *J. Bact.*, 33:39, 1937.
24. Manville, Ira A. The Interrelationship of Vitamin A and Glucuronic Acid in Mucine Metabolism. *Science*, 85:44, 1937.
25. Manville, Ira A., Bradway, E. M., and McMinis, A. S. Pectin as a Detoxication Mechanism. *Am. J. Dig. Dis. & Nutrit.*, 3:570, 1936.
26. Manville, Ira A., McMinis, A. S., and Chuinard, F. G. Vitamin Studies on Apples. *J. Am. Diet. Assoc.*, 10:135, 1934.
27. *Ibid.* Food Research, 1:121, 1936.
28. Arnold, L. The Passage of Living Bacteria Through the Wall of the Intestine and the Influence of Diet and Climate upon Intestinal Auto-Infection. *Am. J. Hyg.*, 8:604, 1928.
29. Arnold, L. Alterations in the Endogenous Enteric Bacterial Flora and Microbic Permeability of the Intestinal Wall in Relation to the Nutritional and Meteorological Changes. *J. Hyg.*, 29:82, 1929.

30. Nedzel, A. J., and Arnold, L. The Influence of Gastric Acidity upon Viability of Bacteria in Isolated Stomach. *Proc. Soc. Exper. Biol. & Med.*, 29:501, 1932.

31. Johnson, T. M., and Arnold, L. Has the Free Gastric Acidity Bactericidal or Bacteriostatic Power? *Proc. Soc. Exper. Biol. & Med.*, 29:501, 1932.

32. Seidmon, E. E., and Arnold, L. Influence of Vitamin A and B Deficiency upon Intestinal Acid Base Equilibrium and Bacterial Flora. *Proc. Soc. Exper. Biol. & Med.*, 29:488, 1932.

33. Arnold, L. A New Mechanism of Defence Against Bacteria Through the Use of Certain Foods. *A.J.P.H.*, 24:854, 1934.

34. Bergeim, O., Hanzen, A., and Arnold, L. The Influence of Fruit Ingestion Before Meals upon the Bacterial Flora. Stomach and Large Intestine and on Food Allergins. *Am. J. Dig. Dis. & Nutr't.*, 3:45, 1936.

35. Sullivan, N. P., and Manville, Ira A. The Relationship of the Diet to the Self-Regulatory Defence Mechanism. I. Hydrogen-Ion Concentration and Bacterial Flora. In Press.

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Committee to Study Motor Vehicle Accidents

THE importance of our problem can be better comprehended when we realize that motor vehicle accidents are the principal cause of fatal accidents in the age group of 5 to 64 and that, if the present rate of slaughter continues, 1 out of every 20 persons in the United States will be injured or killed in a motor vehicle accident within the next 5 years. An even more startling prophecy is that unless some drastic means of combating traffic accidents is instituted, 2 out of every 3 children now living will be injured in a motor vehicle accident in his lifetime.

In most states no provision is made for the furnishing of evidence of physical or mental fitness of motor vehicle drivers. This condition is particularly deplorable since the National Safety Council has made available to all states a model driver's license code.

The importance of adequate driver's license laws is shown by a 9 years trial. In this time, states having a standard license law have decreased vehicle death rates by an average of 20 per cent, while all other groups of states have increased their death rates, some more than 30 per cent. The committee recommends the adoption of the uniform driver's license law by all states, since this would be an additional factor in traffic safety and would not only give the states some control over the driver with physical and mental defects but would be of additional value in collecting records of the chronic law violators, the reckless, and the "accident-prone."—*J.A.M.A.*, June 19, 1937.

Results of Mass Education for Tuberculosis Prevention in Detroit*

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FOR the purpose of practical convenience to its members, the American Public Health Association has seen fit to establish 10 Sections, and among these is one for public health administration and another for health education. The interests of these two Sections are, however, virtually inseparable. We cannot conceive of a well organized modern health department in which health education and administration are not closely coördinated. Education is the bulwark of health promotion and disease prevention. In most small health departments the health officer himself serves as director of health education; only in the larger cities and in state health departments have full-time specialists with trained assistants been employed. The span of health education in its broadest sense is synonymous with the sphere of public health administration. They are dependent one upon the other. There is no need of giving the public the newer knowledge essential to health promotion unless we provide the facilities to make the services universally available. To teach an individual what he should do and then fail administratively to make accomplishment possible, produces negative results. Every individual who has chosen public health work as his life career must of necessity be a health educator. His usefulness to his community will be enhanced with the development of a knowledge of the technics of health education.

The span of health education begins with facts and statistical knowledge; includes popular health instruction as well as school health education, and extends through the preparation of the professional and educational groups whose obligation it is to influence the behavior and attitudes of those fractions of the public which are in need of a specific service; must include the availability of the service of physician and dentist either through the establishment of centers within the office of the family physician and dentist or in the clinic or dispensary; all available notwithstanding the financial status of the individual. Statistics, preparation, availability, notwithstanding financial status, are all necessary to complete the span of health education and public health administration.

Fortunately, in our field we are not dependent upon hypothetical conjecture or philosophical discussion for the

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establishment of a firm foundation on which to build our structure of health. The factors which contribute to high morbidity and mortality are in the main well understood by the student of public health. He knows the sequence of cause and effect; that with a specific inciting agent in a favorable environment, a susceptible person may succumb to a specific disease or condition. In most instances sufficient knowledge of the etiology and mode of transmission of infection is already available. In other cases the research institutes and laboratories are continually establishing new facts and statistics.

It is upon these proved and established features that we develop our health education program. In the case of tuberculosis the epidemiologist warns that with the disclosure of a new case we should search diligently for the infecting case. We can see the inciting agent; we know its general influence upon the human host; we know that minimal tuberculosis can be discovered by the use of the tuberculin test and the X-ray examination of the positive reactor. These are some of the facts with which we must mold our program of prevention and with which we must stimulate and promote positive health.

It is a human trait that the average individual credits his fellow being with a health consciousness equal to his own. We are prone to accept complacently the belief that laymen consider tuberculosis a communicable disease, one spread from person to person through rather extended and close contact. The layman in his turn remains lethargic and uncoöperative, believing that the public health officers, the nurses, and tuberculosis association workers have the situation well in hand and that there is no particular need for lay participation. Too many family physicians labor under the delusion that minimal tuberculosis can be diagnosed on a basis of symptomatology—loss of weight, temperature, night sweats, and hemorrhage. We know only too well that these are the signs of advanced and not early tuberculosis. Possessing statistics on the prevalence of tuberculosis, the trend of the death rate, the frequency of the disease by race, sex, occupation, and the like, we must proceed to the preparation of (1) those groups which are to participate in the dissemination of facts, and (2) to the preparation of those fractions of our community which are in greatest need of this knowledge or who are the guardians of children who need the full advantages of preventive technic.

The first to be prepared are those who, like ourselves, have chosen public health as our life career. With a foundation of biology, the physician, engineer, public health nurse, and technician are being trained in the colleges of their specialty and being exposed to the practical application of their theoretical concepts in the fields of public health administration. The American Public Health Association through one of its Standing Committees is alert to our collective responsibility in the training of adequate personnel. There should be no distinction between those of us who are in official and in nonofficial organizations; all have the same objective—the promotion of community health.

There can be no disagreement with the statement that the family physician should practise preventive as well as curative medicine in his own office. It has been amply demonstrated that there are advantages to the public, the individual patient, the physician, and the health department. The public gains by a reduction in the cost of community sickness; the individual gains in the betterment of his own personal health; the physician finds financial profit as well as personal satisfaction in maintaining the health of his clientele, while the health department

can be proud of the downward trend in the incidence of disease and the improvement of the general health conditions of his area. The President of the Medical Society of the State of New York, Charles H. Goodrich, has recently proposed the slogan "every physician a deputy health officer." [1] In some communities this is virtually an accomplished fact. Nine years ago the Detroit Department of Health deputized 1,200 coöperating physicians, practising preventive medicine in their own offices, establishing health centers available to all alike. The health department actually provided a card on which the physician's name was inscribed and which he displayed on the wall of his waiting room, stating that the health department had deputized him to participate in the health program. Such authorization was, however, preceded by a period of preparation in which each physician was instructed with regard (1) to the administrative plan to be followed by the health department and the local medical society, and (2) with regard to the technics employed in the service to be rendered. Instruction was given in the use of toxoid, the application of the Schick and Dick tests, the reading of results in the tuberculin test, the relationship of X-ray findings to the diagnosis of tuberculosis, etc. Postgraduate conferences were established; clinicians and public health experts have been imported from distant points at public expense to assist in the training of this new personnel (the family physician) added to the already existing community agencies dealing with preventive medicine. Those physicians who were not wont to attend medical meetings have been sought out in their own offices by a full-time Director of Medical Relations whose sole responsibility is to see that the coöperating physicians are qualified to render the type of service to which the public is entitled. Instruction has been given to undergraduates in medical schools. No opportunity to stimulate the interest of the family physician has been overlooked. The results are significant as evidenced by an increasing tendency for the public to purchase more preventive medicine at the hands of the family medical counsellor. For the immunization of only 18 per cent of the Detroit children known to have been protected against diphtheria during the past 2 years did the health department pay.

Assuming the preparation of the professional public health worker and the participating physician (and the same applies to a participating dentist), we then proceed to the preparation of the public, employing as our agents the generally accepted tools of health education. It is our task to stimulate a response on the part of the individual in order that a health attitude will be established and he will voluntarily seek the service or advice which has been suggested in the interest of his health or the well-being of the members of his household. To stop here, however, we will not have completed the span of health education and administration. There is no need to excite people about the ravages of syphilis or the devastating influence of tuberculosis unless we prepare and establish the facilities through which the individual may receive the benefits which are his due.

We therefore come in our discussion to the question of availability of service. In general, there are two methods which have been pursued in health department procedure. We have clinics for well babies, infants, and school children. There are clinics and dispensaries for the diagnosis and treatment of syphilis and tuberculosis and for the correction of physical defects. There are dental clinics and medical clinics. On the other hand there is being introduced the new concept, al-

ready referred to, of a health center in the office of each practising physician; a place to which the layman may go and obtain adequate preventive service and still maintain that cordial close relationship between the family and its medical counsellor. It is not the purpost of this paper to discuss these two methods of making service available to the public. Suffice it to say that in Detroit, as is well known, there is a distinct leaning to the plan of medical participation and it is on this basis that the present program of tuberculosis case finding has been established. Finally, we come to the end of our span of health education—a point on which there can be no disagreement—that notwithstanding the financial status of the individual, the preventive service or the health promoting activity should be available to all alike.

As has been discussed in detail elsewhere,[2] based upon the concept of public economy, an intensive tuberculosis case finding program was initiated in Detroit during the final weeks of 1936 and the early weeks of 1937. In a community with over 900 deaths annually from tuberculosis (corrected for residence) and with 2,400 hospital beds available to the health department with a resulting obliteration of the usual waiting list, where $2,500,000 is being spent annually for hospital care, it seemed economically illogical to spend such a huge sum for the end results of tuberculosis. Prior to the beginning of this new undertaking not more than 13 per cent of all cases reported by physicians for hospitalization to the health department were in a minimal stage at the time of report. Adding to this the follow-up work of a large health department clinic, there were only 20 per cent minimal. Incidentally, our own Association gives a perfect rating for a city which reports 20 per cent minimal. It is reasonable to believe that by a more intensive case finding program the per cent of minimal in relation to total cases can be materially increased—even as high as 50 per cent. If this could be done the saving to Detroit in hospital bills would be not less than $1,000,000 annually. Why not spend one-fifth of this amount for prevention and save the other $800,000? It was on this basis that the approach was made and the funds were appropriated by the City Council following a well conceived and rather spectacularly executed series of newspaper stories by Paul de Kruif and A. M. Smith, tied in with a series of radio dramas written and executed by Station WWJ, owned by *The Detroit News*. Prior to this, each year the Detroit Department of Health was spending $180,000, or 12 cents per capita, for the prevention of tuberculosis. This money was used largely for the employment of physicians, publice health nurses, and the maintenance of clinic service with a total attendance of 41,102 in 1936, and for such miscellaneous services as usually are found in a modern health department. This sum does not include the cost of the Division of Health Education which in 1936 spent $30,000. The addition, therefore, of $200,000 annually to tuberculosis prevention has more than doubled the appropriation. With this sum there has been purchased the full-time services of 3 highly qualified specialists (a Director of Medical Relations, a Director of Statistical Studies, and an Associate Epidemiologist), 45 new public health nurses, 10 additional statistical clerks, and 2 additional health educators. There has been set aside $80,000 to pay physicians for tuberculin tests and X-ray examinations. A fund has been established for the maintenance annually of 2 post-graduate courses in preventive medicine for family physicians—one in the fall, the other in the spring (each to include 12 hours in preventive medicine).

It is well to emphasize that in the

extension of our case finding facilities in Detroit, we have not destroyed any previously existing service. The clinic of the health department has continued to function with no diminution of service. The old conventional program even including the tuberculin testing of high school children has been continued (there were 9,594 tuberculin tests in 1936). There has been, however, added to the statistical foundation the services of a well qualified medical statistician, ably assisted by 10 statistical clerks, in addition to certain WPA personnel. The preparation of the medical profession has definitely become the responsibility of the Director of Medical Relations, who gives his undivided attention to this service and who has $3,000 for the promotion of postgraduate instruction.* The preparation of the public has been improved by the addition of the public health nurses and the additional health education personnel. The availability of the service has been provided for through the medical participation plan wherein there are 987 family physicians † who are qualified and able to render the required service in their own offices, under a plan directed jointly by the Wayne County Medical Society and the full-time administrative and technical personnel of the department of health. The financial situation has been met by agreement to pay the physician $1 for a tuberculin test in all instances where, in the physician's judgment, the family is unable to meet this expense; $3 to the coöperating roentgenologist † for his flat plate examination and written report; an additional dollar to the family physician for final consultation with the patient, that is, after he has received the report from the roentgenologist. The health department, therefore, may be called upon to pay $1 for a negative tuberculin test and as much as $5 for each positive test.

While there are many so-called "hot spots" in our fight against tuberculosis, we have adhered rigidly to the examination of three important groups: (1) residents of those households in which there has recently occurred a case or death from tuberculosis; (2) those individuals residing in areas of high mortality; and (3) those casuals who filter through the physician's practice, the examination of whom provokes a suspicion of tuberculosis.

The newspaper publicity which consisted only of first page stories began on November 8 and ran for 11 consecutive days. Five minute radio programs were presented on these same days. Beginning on Wednesday evening, November 11, a 30 minute dramatization started and was continued weekly until June 1. The appropriation for new personnel became available on January 1, 1937. The first month was spent in training personnel, and field work actually began February 1.

Local publicity was not started until the nurses were ready to begin work in the field, in order that some check could be made on the value of city-wide publicity alone.

As the nurses advanced in each district, additional preparation of the public was made for them by the use of foreign language and Negro newspapers, visits to the clergy which resulted in announcements from pulpits, group meetings, poster displays, and the careful distribution of literature. The Department of Public Welfare coöperated through the district with special emphasis placed upon the program by Welfare workers. Most other organizations in the district accepted the program as their own.

* During the winter of 1936-1937, 544 physicians attended the postgraduate lectures on tuberculosis.

† As of September 17, 1937, 373 different physicians have reported tuberculin tests and 39 physicians have reported X-ray examinations.

From February 1 to July 1 the public health nurses made a house-to-house canvass in a section of the city with the highest tuberculosis death rate. Approximately one-half of the people residing in this area are Negroes. Prior to July 1, 41,434 individuals * from all sections of the city called at the office of their physician of choice, received a tuberculin test, and the report of the test was forwarded on a suitable card to the Department of Health. Of this number, 10,010, or 24.2 per cent, had a positive tuberculin test. These were individuals at all ages. Of these, 7,403 * have completed the X-ray examination, and from this number have been found 207 new active cases of tuberculosis.† Of these, 70 per cent have either been hospitalized or are in the process of hospitalization.

It is now our intent to report upon the response which has been obtained from white and colored households located in the area of high mortality. The present study is limited to a tabulation of those households with which the public health nurse made her first contact (in this tuberculosis program) during the month of February. In all, 746 white households and 1,294 colored households are included. The first nursing visit was made in February and two subsequent effective visits (visits where a member of the family was actually contacted) were made to ascertain whether the members of the household had responded by going to the office of their physician and requesting a tuberculin test. As the intensive newspaper general publicity was carried in November, it is apparent that these nursing visits occurred about 2 to 3 months later.

Various combinations of time intervals between the visits of the nurse occurred. The most frequent combination was the one where there were from 20 to 30 days between the first and second visits of the nurse; and from 40 to 60 days between the second and third visits of the nurse. Such interval-combination occurred for 52.4 per cent of the white households and for 54.9 per cent of the colored households.

In one sense the households considered do not constitute a sample—in another sense they do. We have included all the records on file for the area concerned and, therefore, we have not selected certain records for analysis. Furthermore, for the area considered, the nurses visited every home. They went up and down the streets and, to all intent and purpose, made a regular census. In another sense, however, the households included do constitute a sample, for they relate only to one section of the city in which dwell people of a certain economic level.

The situation is briefly this: a leading metropolitan newspaper featured tuberculosis in front-page stories, carried for 11 consecutive days; a five minute radio drama (on each of the 11 days) called public attention to the newspaper stories; a 30 minute radio dramatization of the life work of some great pioneer in preventive medicine was presented each Wednesday evening (for 24 weeks) before a studio audience of 300 invited guests and broadcast on Detroit's most popular radio outlet; the health education division of the Health Department through its routine contacts (especially the colored guilds) stressed tuberculosis; the medical profession was alert to its responsibility and participation, likewise the tuber-

* As of September 17, 53,979 tuberculin tests have been reported with 24.9 positive; 10,355 X-ray examinations have been reported.

† Since July 1, 116 X-ray examinations indicating the presence of active tuberculosis have been reported (as of September 17). Upon further examination, some of the individuals concerned may be eliminated as not having active tuberculosis. In other words, the total number of discovered cases will undoubtedly be less than 323.

culosis association; leaders in business, industry, education, and the professions added their support. About 2 months after the publicity began, public health nurses made a house-to-house visit in an area of highest mortality (50 per cent colored) urging every member of the household to go to his own physician and secure a tuberculin test. What happened in this area before and after the nurse's visit and what was the relative value of 2 or 3 visits?

In the 746 white households there were 3,512 individuals of whom 672, or 19.1 per cent, responded. Of these responses, 9, or 1.3 per cent, occurred before the first visit by the public health nurses; 117, or 17.4 per cent, after the first visit and before the second; 375, or 55.7 per cent, after the second visit and before the third; 161, or 24.0 per cent, following the third visit (see Table I).

In the 1,294 Negro households there were 5,844 individuals of whom 2,652, or 45.4 per cent, responded. Of these responses, 118, or 4.4 per cent, occurred before the first visit by the public health nurse; 721, or 27.2 per cent, after the first visit and before the second; 1,464, or 55.2 per cent, after the second visit and before the third; 349, or 13.2 per cent, following the third visit.

Only 0.25 per cent of the whites living in the households responded before the nurse visited the home; 2 per cent of the Negroes responded, *i.e.*, 8 times as many colored people sought a tuberculin test as a result of the general educational program which preceded the nurse's first visit. This may be due to the excellent work of the women who constitute the membership of the Negro guilds and their other local organizations. Among neither the white nor colored people was the response significant.

It is evident that in the group being studied, more than twice as many colored people responded to the total educational activity (including the nursing visits) of the program, than did the white people. Of particular note is the fact that nearly one-half of the colored people approached, responded.

Assuming that the third visit of the public health nurse was not made and,

TABLE I

Tuberculosis Case Finding, Detroit Response to Three Nurse Visits—First Visit Made in February, 1937

	Number of Families	*Number of Individuals*	*Individuals Responding*	*Relation of Response to Visit of Nurse*		
				Relation	*Number*	*Per cent*
White	746	3,512	672	Before 1st Visit	9	1.3
				After 1st Visit	117	17.4
Per cent Responding			19.1	After 2nd Visit	375	55.8
				After 3rd Visit	161	24.0
				Unknown	10	1.5
				Total	672	100.0
Colored	1,294	5,844	2,652	Before 1st Visit	118	4.4
				After 1st Visit	721	27.2
Per cent Responding			45.4	After 2nd Visit	1,464	55.2
				After 3rd Visit	349	13.2
				Unknown	...	....
				Total	2,652	100.0

further, assuming that none of the responses recorded as following the third visit would have occurred if such visit had been omitted, of all individuals comprising the white households, the total response would be 14.3 instead of 19.1 per cent. The second assumption is a poor one because a certain number of people recorded as responding after a third visit probably would have done so in the absence of this visit. In the colored households 39.4 per cent (instead of 45.4) would have responded after two visits. For white households the third visits required a total of 746 additional visits, and for colored households, 1,294 additional visits. Perhaps the added work involved, represented by 2,040 nursing visits, is not justified by the additional response obtained when 3 rather than 2 visits are employed.

In summary, there has been added to a conventional program of health education in tuberculosis control (including newspaper, radio, guild organization, talks, routine public health nursing, etc.) a more specific public health nursing educational service, operating under a medical participation plan which makes the service available in 1,000 offices of private physicians notwithstanding the financial status of the individual. The nursing field service seems essential for results. Limiting the number of visits to two seems economically and administratively sound.

REFERENCES

1. Goodrich, Charles H. Address delivered at the Annual Conference of Health Officers and Public Health Nurses, Saratoga Springs, N. Y., June 22, 1937.
2. Vaughan, Henry F., and Douglas, Bruce H. Intensive Case Finding Work in Tuberculosis. *J.A.M.A.*, 109:771 (Sept. 4), 1937.

Health Congress at Birmingham

. . . And I would like, just in a few minutes, with a view to stimulating further efforts, to recall some of the achievements of the 60 years that have passed since the days when the Institute was founded. It is a remarkable contrast. In those days the general standardised death rate was 20.3 per thousand; the crude death rate from tuberculosis was 2,866 per million; the infantile death rate, of infants below 1 year, was 149 per thousand births; and the crude death rate of children between 1 and 5 years was 31.2 per thousand living. Let us look at the corresponding figures for 1936. The general standardised death rate was 9.2 per thousand, a fall of one-half; the death rate from tuberculosis, 692 per million, a fall of three-quarters; the infantile mortality rate, 59 per thousand births, two-fifths of the previous figure; the crude death rate of children between 1 and 5 years, 5.5 per thousand living, a little over a sixth. I think it can be said, not, I hope, by any manner of means a boast, that by every known canon the health of the average English man and woman, and especially of the English child, is better today than at any time since the industrial revolution.—Address by the Right Hon. Sir Kingsley Wood, M.P. *J. Roy. San. Inst.*, Aug., 1937.

Education in Nutrition by Private Agencies*

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A THOUSAND and one sources of information on various aspects of human nutrition now seem to be available to harassed health officials, physicians, nurses, social workers, school teachers, and others who desire or need practical data on this important subject. Some of these luminaries, particularly the school teachers, are literally bombarded with dietary propaganda, the acceptance and use of which may or may not be advantageous and wise.

Despite this amazing profusion of real and alleged educational material on diet, most of the persons in the professional groups mentioned need reliable facts about the relation of food to health, since comparatively few of them display any precise or extensive knowledge of this topic. Nutrition is often a neglected subject in medical, nursing, and public health schools.

Some of the available information on dietetics is trustworthy; some of it is on the borderline of reliability; some of it is misleading and prejudiced, but not necessarily dangerous; and some of it is not only unreliable, but perverted, dishonest, and injurious.

In the first category, that of authenticity, is the dietary information emanating from such official or quasi-official agencies as the federal government and most of the state governments, from the League of Nations, and from the leading universities; and that coming from such unofficial and private agencies as medical and public health associations, social welfare organizations, ethical trade associations, honorable business concerns, some of the leading popular magazines, a relatively few of the existing consumer organizations, and many individual scientists of standing.

In the other categories, ranging from mere unreliability through prejudice and extravaganza to downright dishonesty and pernicious faddism, is the information or misinformation on foods disseminated by some of the more mercenary commercial interests, by many of the self-appointed consumers' organizations, and by numerous individual food fakers and charlatans, who have succeeded in influencing a certain deluded fraction of the gullible public.

THE NEED FOR DISCRIMINATION

The seeker after sound and sensible facts on human nutrition must, therefore, learn to discriminate between these various sources of information. Selection of dietary truisms and rejection of those which are lopsided is not always an easy task for the uninitiated. Scientists themselves some-

* Read at a joint session of the Child Hygiene, Food and Nutrition, and Public Health Nursing Sections of the American Public Health Association at the Sixty-sixth Annual Meeting in New York, N. Y., October 8, 1937.

times make mistakes. Even a Nobel prize winner may display weird ideas on nutrition, ideas that are not strictly in accord with established facts, and there is at least one distinguished physicist who has succumbed to the erroneous and impossible notion that proteins and starches should not be mixed in the diet.

It has been estimated that food manufacturers spend a total of several hundred million dollars a year on educational material. Most of it is far more attractive and much more persuasive than the material issued by the government departments and by voluntary health and welfare associations.

How much of this commercial educational material can and should be used in schools and by health departments? That depends, of course, upon the ethics, ideals, and honesty of the producers and upon the nature of the material. Pamphlets, posters, and projects issued by trade associations and individual concerns regarding such recognized protective foods as pure milk and dairy products, fruits, bread, and meat and fish are, in general, acceptable, provided they give a well rounded concept of nutrition and do not attempt to exaggerate the relative significance of a particular commodity. These associations and firms are, in fact, beginning to realize that the misapplication to their products of such fanciful and unqualified terms as "wonderful," "remarkable," "marvelous," "energy-producing," "health-giving," and the like, can no longer inspire confidence.

These commercial agencies have also learned that there is a definite technic in the preparation of educational material on food; that it must be adapted for the special purpose for which it is intended, such as classroom instruction in a certain grade; that it must be impartial and accurate, as well as alluring; and that the development of the material should be entrusted to an authority in the field, rather than solely to an advertising agency.

THE NEED FOR THE SCIENTIFIC APPROACH

Every commercial producer of educational matter on food should have upon its staff at least one competent scientist who can act as a balance-wheel, particularly against the enthusiastic claims and exuberant half-truths that often erupt from many of the advertising copy writers. These producers of copy are, in general, well intentioned, honest, and coöperative, but they are seldom qualified by training and experience to prepare properly balanced pronouncements on nutrition. They are actuated primarily by the sales motive, which may be expressed in bombastic claims having little if any scientific justification.

The Council on Foods of the American Medical Association has performed a noteworthy service to food manufacturers, to physicians, and the public, by enunciating certain standards for advertising claims on foods, and by accepting various reputable products and the claims made for them. Pamphlets and statements accepted by this Council may, therefore, be used with confidence by health officials and others, although there are, of course, numerous reputable food products and materials that have not been submitted to this unofficial organization.

Among the associations that generally have acceptable material on nutrition, which in the opinion of the writer can be used to advantage by health officials and in schools, are the National Dairy Council, the Milk Industry Foundation, the Evaporated Milk Association, the Certified Milk Producers Association, and the International Association of Ice Cream Manufacturers, all representing the dairy industry; the American Institute of Baking, and the Wheat Flour Insti-

tute, representing the bakers and millers; the National Canners Association; and the Institute of American Meat Packers.

According to lists issued by the U. S. Department of Commerce, there are now in existence about 300 national and interstate trade associations concerned with various edible foods, not to mention another 100 trade associations in the alcoholic beverage field, and 1,000 local associations of food retailers and restaurateurs. Many of these agencies undoubtedly have issued publicity and propaganda, which obviously should be used, if at all, with some discrimination by official groups, especially when the material is concerned with foods or beverages of limited or questionable dietetic value, or with imitations or substitutes for more nourishing foods.

That some of this available material from commercial sources is definitely unsatisfactory is indicated by a recent survey conducted by M. Elizabeth Winkelhake for the American Home Economics Association.[1] In an analysis of approximately 300 advertising booklets used by teachers of home economics in their classrooms, it was reported by specialists who examined this material that 75 per cent of the pamphlets contained questionable statements, that 37 per cent contained false statements, that 43 per cent contained unsubstantiated statements, and 59 per cent contained misleading statements.

Assuming that the personal convictions of the judges of these booklets represent valid scientific opinions, this report would seem to be an indictment of much of the type of advertising that appears in the guise of educational information. It is not, however, an indictment of the nutritional material from private agencies when it conforms to the accepted standards of ethics and scientific accuracy that have been outlined above.

THE NEED FOR MODESTY AND BALANCE

The leading life insurance companies are among the commercial interests that have issued attractive and authentic pamphlets on nutrition, since it is profitable for these concerns to promote good health among their policy holders and the public, and they are not concerned with individual products. Routine use of this material by other agencies is both legitimate and desirable, provided the user has no objections to the display of the name of the company, with its incidental advertising values, although such displays are seldom unduly conspicuous.

Commercial producers of educational material on nutrition should religiously refrain from emblazoning their names and the names of their products in blatant style upon their pamphlets and posters. They are, of course, entitled to proper credit for these contributions, but the display of the name should be modest and inoffensive, and not calculated to give the idea that the sole purpose of the material is for sales and advertising. Concerns who seem merely to have something to sell are properly regarded with suspicion by public health and school authorities, whereas those who apparently are trying to be helpful are always welcome in these fields.

Several years ago the suggestion was made by the author that there be established a commercial health council, which would coördinate the efforts of business in public health, set appropriate technical and scientific standards for the health material issued, and act as a clearing-house, being analogous in its rôle to the National Health Council in the field of our national voluntary health associations.[2] In renewing and urging this recommendation, the adoption of which would unquestionably be a forward step in bringing about a proper correlation between the health educational activities of government

departments and ethical business, it might be suggested that national medical and public health associations would probably be glad to aid in the guidance of such a commercial health council, and they might even profit from the association with it.

NEED FOR COÖPERATION BETWEEN GOVERNMENT AND BUSINESS

In a recent provocative editorial in *The Health Officer,* issued by the U. S. Public Health Service, the question was raised as to whether government and business should coöperate in health education.[3] Citing the experience of the U. S. Bureau of Mines in arranging for educational motion pictures, produced and paid for by private business, this editorial points out the advantages of such coöperation, states that no difficulties have been encountered in more than 15 years' operation of this policy, and asks whether similar arrangements could not be made between public health agencies and commercial interests, especially in the fields of radio and the cinema.

The profit motive which must necessarily actuate business, certainly is not irreconcilable with the cultural and educational motive, which presumably actuates health authorities. The right kind of material put out by the right concerns can and should be used by official agencies. The editorial referred to asserts that the profit motive of life insurance companies, which make money by promoting health, is in harmony with the commonweal. The same may be said of a milk company, a bread company, a fruit company, or the purveyor of any commodity that is acknowledged as a necessary or desirable component of the human diet, or can offer a real and substantial contribution to modern public health.

Where more than one concern in a particular field has made available material of equivalent value, all of it should be used impartially. If only one company has produced worth while material, it deserves recognition for its initiative. If there are objections to any single concern, there certainly should be no objections to the output of an ethical trade association representing an entire industry, such, for example, as the National Dairy Council or the American Institute of Baking.

Every worker in the field of public health, whether in the rôle of health officer, practising physician, social technologist, nurse, or school teacher, should have a practical knowledge of the established principles of human nutrition. Such a working knowledge can be acquired by reading and studying a few of the standard texts by the leading authorities, including Sherman, McCollum, Rose, Lusk, Mendel, Eddy, Bridges, McLester, Sure, Harris, and Fishbein, and other authors whose books on nutrition are favorably reviewed in the *American Journal of Public Health,* and other leading medical, public health, nursing, and scientific magazines.

With such a background, the public health worker will be better equipped to discriminate between the well balanced and the invidious educational material of the private and commercial agencies. If he is still perplexed, he can go to some authoritative source among the governmental and national voluntary health associations for further advice and enlightenment.

Ethical and well balanced material on nutrition from commercial sources should not, moreover, be regarded invariably with scorn or suspicion, but should be utilized for what it is worth. The time may come when the budgets of health departments and schools will permit of the development and distribution of propaganda material that approaches that of the commercial agencies in attractiveness and pedagogical values, but that time does not

yet seem imminent. For the present, therefore, whatever is worth while should be employed in an impartial manner, especially since the public health official and honorable business usually have the common goal, the promotion of public interest in the personal improvement of health.

SUMMARY

Numerous sources of educational material on nutrition are now available to professional workers interested in public health. The problem is not to get material, but to discriminate between the good and the bad.

Nutritional facts issued by reputable trade associations and individual concerns may be utilized to advantage in schools and health departments, when such material is reliable, accurate, well balanced, and free from too blatant sales and advertising motives.

Industrial organizations interested in the promotion of the public health should create a commercial health council to set technical standards for their material, and to coördinate their activities with those of official and voluntary national health agencies.

The profit motive is not irreconcilable with cultural and educational motives, since honorable business is as much concerned with the public welfare as are official bodies.

REFERENCES

1. Winkelhake, M. E. Advertising from the Standpoint of the Consumer. *J. Home Econ.*, 29:88 (Feb.), 1937.
2. Tobey, J. A. Business Discovers Health. *Tech. Rev.*, Mar., 1930.
3. Edit. Should Government and Business Cooperate in Health Education? *Health Officer*, July-Aug., 1937.

Results of Publicity

From a Case Worker's Report to State Bureau of Venereal Disease Control:

"Mrs. T., I found, had been very despondent over this situation (recent discovery that she had syphilis). She felt this disease was an unjust affliction, as she had always led a normal life. She had even contemplated suicide because of the stigma she believed was always a part of the suffering caused by syphilis.

"After reading one of the articles in the *New York Daily News* and learning of the prevalence of the disease and the number of persons innocently infected, she had a different outlook on the situation and decided to take her treatment and cease worrying . . ."

Incidentally, this series of articles won for the *News* the Pulitzer award of honorable mention for "the most distinguished and meritorious public service rendered by any American newspaper during the year."—*Plain Facts*, New Jersey State Department of Health, September, 1937.

Virus Diseases and the Public Health*

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WHY should the virus diseases be singled out for special consideration at this meeting of the Laboratory Section of the American Public Health Association? Without knowledge of what passed through the minds of your program committee I can suggest three cogent reasons:

1. The knowledge of virus diseases is advancing by leaps and bounds and opening up promising new fields of investigation and disease control.
2. Health authorities are not yet taking a part proportional to their responsibility and the increasing opportunities in the investigation and control of virus diseases.
3. The diseases due to viruses are of great and growing importance in the field of preventive medicine.

After a long period of relative stagnation in the study of diseases caused by filterable viruses, during which attention was given mostly to those disease agents which could be seen through the microscope, grown in lifeless media, or tested in the guinea pig, an era of great productivity has been entered. New methods, new technics, new apparatus, and new laboratory animals have been discovered and put to use. New viruses are continually being announced as the causes of diseases of man, animals, plants, and even bacteria. These previously baffling invisible agents are being measured by ultrafiltration or by their behavior in the intense centrifugal field, and are being concentrated in specially devised high-speed centrifuges. Their power to stimulate the production of protective and other antibodies is being studied by quantitative immunological methods and has become the basis of various useful tests. Their degrees of virulence for different animals and for the various tissues of the same animal are being studied and modified. They are being grown in living cells in standard laboratory glassware by simple tissue culture technics, or even in living embryos in egg or uterus, both for producing virus in quantity and for intentionally altering the virulence for certain tissues. For investigational purposes it has been found possible to store virus strains for years without change of character, after drying in the frozen state and sealing in glass tubes. Methods of protective vaccination are being devised and tested for efficacy and safety. Chemical and physical methods are being increasingly applied in bringing to light important evidence of the fundamental nature of viruses. In fact, more is already known about some of the viruses than about many of the bacteria whose morphology and cultural characteristics have long been familiar.

The health agencies, in general, have not given the virus diseases the attention they require. In the United States most state and local health de-

* Read before the Laboratory Section of the American Public Health Association at the Sixty-sixth Annual Meeting in New York, N. Y., October 6, 1937.

partments seem to have made their greatest progress through the multiplication of routine service without proportionate attention to the study of the new and special disease problems of their areas. The need for an attack on the virus diseases would be an additional incentive to put a larger number of skilled epidemiologists into the field where disease can be studied in its environment, and to assign more laboratory workers to collaboration with the epidemiologists and to research in laboratory problems of public health importance. I am sure that many of you have regretted the tendency to mechanize epidemiology by increasing the less expensive clerical and statistical handling of routine reports at an administrative office, without arranging for adequate intensive field studies by competent epidemiologists with their base at the laboratory. The virus disease problem at its present stage demands that health authorities take part in the blazing of new trails by field and laboratory research, and that they be prepared carefully to test each new and promising control measure in the virus field before it is sanctioned or used. These functions will usually require special training for selected members of the laboratory staff, some supplementary equipment, and increased provision for experimental animals. It is where the responsibility for health protection rests that methods should be tested, improved, and applied.

The diseases of the virus group include affections of the greatest public health importance. Effective methods for the control of smallpox, rabies, and yellow fever were established long ago by Jenner, Pasteur, and Reed, but they are in need of review and improvement under the searching new technics. False disease entities of prime public health importance, for example the hodgepodges called "influenza" and "the common cold," contain virus diseases which seriously and constantly threaten the public health but which have only begun to emerge from the confusion of unknown and multiple etiology. There is evidence that certain viruses acting as incitants of "influenza," "colds" and other diseases open the door to more serious bacterial infections, which will probably be most easily prevented by identifying and controlling the primary virus factor when our knowledge has advanced far enough.

The number of diseases of man known to be caused by filterable viruses is already impressively large, and there are additional ones probably so caused.[1] Those regarded as definitely in the virus group include smallpox, vaccinia, measles, mumps, epidemic influenza, a variety of common cold, poliomyelitis, psittacosis, herpes simplex, rabies, encephalitis of the St. Louis type, Japanese type B encephalitis, lymphocytic choriomeningitis, lymphogranuloma inguinale, foot-and-mouth disease, Australian X disease, louping ill, Rift Valley fever, yellow fever, dengue, pappataci fever, certain kinds of warts, and *molluscum contagiosum*. The additional diseases strongly suspected of being caused by viruses include German measles, chicken pox, epidemic encephalitis or Economo's disease, and herpes zoster.

Should not the governmental authorities carrying the recognized responsibility for health protection decide which of the virus disease problems in the fields of their jurisdictions are the most important and which are most promising for study, and proceed to carry on adequate investigations and experiments in control? While endowed research institutions and universities have certain advantages in fundamental research in general, it is the public health authorities that can have the clear vision, inspiration, and persistence in investigation, which are born of direct

responsibility for human lives and intimate contact with uncontrolled disease. Their understanding of the urgent needs, in the presence of a wealth of material for observation, puts them in a strategic position for selecting and solving outstanding problems through research, and also for converting the fundamental discoveries of other investigators into useful tools for field study and prevention.

EPIDEMIC INFLUENZA

These general statements need the support of a few examples. Consider for instance epidemic influenza, a specific disease caused by a virus first isolated in England by Smith, Andrewes, and Laidlaw,[2] and also intensively studied in the United States by Francis and his associates.[3] This is the first disease to be raveled out of the group of symptom complexes known as "influenza." The virus has been isolated by transfer from man to ferret in many epidemics in widely separated parts of the world, and it has been transmitted from ferrets to mice. It is being employed diagnostically in standardized tests of human sera in mice for the specific protective antibodies. Moreover, the virus grown in tissue culture has already been used in experimental vaccination with encouraging results.[4]

Hopes have been raised prematurely in popular writings that influenza has been conquered by the new discoveries, notwithstanding the fact that it is not yet known how much of the so-called influenza is the specific disease under study, what is the relationship between epidemic influenza and the periodic influenza pandemics, how widely epidemic influenza is distributed geographically, where the infection exists in the intervals between the characteristic epidemics, and how enduring and effective is the immunity produced by vaccination or the natural disease.

The study of this newly defined specific infection by state health laboratories with the collaboration of epidemiologists, clinicians, and pathologists offers great promise. The most obvious approach would be for the state laboratories to undertake the investigation of epidemic influenza, commencing with the study of standard laboratory strains in inter-epidemic seasons and the isolation of new strains during epidemics. Additional evidence as to the nature of the infection could be obtained by observing, through the protection test in mice, the appearance and increase of protective antibodies in the blood of patients during and after suspected attacks of epidemic influenza. There is evidence that complement-fixation tests may also give valuable information. It is not an unreasonable hope that state laboratories engaged in such work will discover other viruses in the influenza-common cold group and will take an important part in devising control methods for the various specific diseases thus given identity on an etiological basis. It would be only a wise foresight for the people through their health authorities now to make such an investment toward preparedness against another devastating pandemic of influenza. By the same effort they would be taking steps toward understanding and preventing the prostrating epidemic influenza outbreaks of almost every winter and spring. It would be inexcusable if the next pandemic should find us still in the same state of scientific impotence. Fortunately, among the public health agencies in North America, two state departments of health, those of Minnesota and California, and the Connaught Laboratories in Toronto, are already undertaking the study of epidemic influenza.

VACCINIA

Vaccinia is a virus disease of paramount importance to the public health,

because inoculation with its virus is the sole dependence of civilized nations for preventing the return of the old-time deaths and disfigurement from smallpox. Vaccinia has probably been studied more than any other of the viruses producing disease in man. The methods of manufacturing the virus for vaccination purposes and the technic for inserting the virus into the skin have been greatly improved. The present common practice, however, still contains the small risk inherent in the possible inoculation of unknown contaminating bacteria along with the virus and the creation of a vesicle which often becomes an open lesion of the skin. The production of vaccinia virus for vaccination purposes in tissue culture by the methods of Rivers,[5] or in the chick embryo within the egg as first accomplished by Goodpasture and Buddingh,[6] promise the long awaited solution of the problem of completely excluding bacteria from the vaccine. Moreover, by a careful intradermal technic [7] it has been found possible to inoculate a bacteria-free vaccine so as usually to avoid vesicle formation, the infectible open lesion, and the scar.

It is an opportunity and a responsibility of the health authorities to test the more promising of the proposed new methods of vaccination against smallpox for efficacy as well as safety. They will doubtless wish to encourage their general introduction when, and only when, it has been made evident by controlled observations that they have advantages over the older methods and at the same time are sufficiently potent and productive of lasting immunity. The health authorities are the appropriate group to give the verdict as to the desirability of the general use of any of the new procedures so ingeniously developed in the research laboratories. While the efficiency of vaccination must be maintained, it is also important that no opportunity should be missed for making compulsory vaccination laws less unpopular and their evasion less frequent by eliminating all unnecessary risk, discomfort, and scarring.

RABIES

A third virus disease of public health interest is rabies. Essentially a disease of animals, it nevertheless causes some human deaths and necessitates preventive treatment of many persons bitten by rabid animals. Such treatment is expensive and time consuming and carries a degree of risk of failure or treatment paralysis. Rabies prevention cannot be considered successful until the disease and also the need of treatment of persons has been eliminated or greatly reduced. Under certain favorable conditions the disease has been controlled by the muzzling, leashing, quarantine, and destruction of dogs. In the United States these control measures, limited in their application, have not been adequate and the disease appears to be prevalent and increasing in some states. The reported successes in rabies control through the vaccination of dogs in Japan and the availability of one-dose commercial vaccines for dogs has led certain communities to encourage or require the inoculation of dogs in spite of some unfavorable reports as to the efficacy of the method as practised in the United States. The weakness of the situation is that application of the new method has run ahead of investigation. The rabies work in most state health laboratories is almost exclusively diagnostic, and consists chiefly of the microscopic search for Negri bodies in the brain tissue of animals, and the occasional inoculation of laboratory animals. What is urgently needed is the investigation of rabies as a disease of animals, a study of its immunology and epidemiology, and above all exhaustive laboratory tests of any new immunizing

measures or vaccines before they are approved for use or given recognition in the statute books. There is also need for quantitative and comparative investigation of the antirabic vaccines now in use for man and animals. The studies advocated are becoming possible and increasingly practical, for new virus technics for investigating rabies are being made available. Webster [8] has developed a sensitive diagnostic test through the intracerebral inoculation of brain tissue into mice, and also a quantitative mouse protection test for antibodies in the sera of vaccinated persons or animals. Moreover the State Board of Health of Alabama is carrying on a series of field and laboratory studies of rabies and the existing methods of control.

YELLOW FEVER

As a fourth and last example I shall speak of yellow fever, a tropical virus disease which used to invade the United States and produce devastating epidemics, and which is still threatening. In 1927 effective laboratory investigation of this disease was made possible through the discovery of the susceptibility of rhesus monkeys by Stokes, Bauer, and Hudson,[9] and in 1930 the mouse also became available as an experimental animal through the research of Theiler.[10] Through transmission experiments by various investigators it was shown that other mosquitoes than *Aedes aegypti* are potential vectors in Africa and South America. By testing human sera from many parts of the world in mice for the presence of protective antibodies, two large, previously unsuspected endemic areas were revealed in the interiors of Africa and South America. Field studies and the examination of numerous liver specimens taken after death from brief febrile illnesses showed that typical fatal yellow fever was present in the South American endemic area, and of even greater importance was the observation by Soper and his associates [11] that yellow fever was occurring in places in the endemic area of South America in the complete absence of *Aedes aegypti*. They have called the disease, when spread without this mosquito, jungle yellow fever. These discoveries showed that yellow fever must be accepted as a threat of indefinite duration to all infectible parts of the world.

Before yellow fever can be attacked successfully in its endemic areas, more must be known of the epidemiology of jungle yellow fever. Every effort is now being made in the field by the International Health Division of The Rockefeller Foundation coöperating with government health departments to discover the unknown vectors and hosts. In the meanwhile improved methods of vaccination [12] are being used increasingly to protect people under exceptional exposure. To prevent the spread of the infection from the endemic areas the neighboring inland towns and cities will have to be watched and kept as free from *Aedes aegypti* as possible and the rigid aegypti control in important seaports and airports will have to be maintained. Steps are being taken to prevent the carrying of infected persons during the incubation period to infectible countries by airplane or otherwise. Vaccination against yellow fever will be useful in this connection as a supplementary measure. Precautions are also needed against the carrying of infected mosquitoes by airplanes. Specific measures to prevent the spread of yellow fever by air travel are laid down in the International Sanitary Convention for Aerial Navigation signed at The Hague in 1933.[13]

As a last line of defense the cities at or near airports in distant infectible countries, including the warmer parts of the United States, will need to be kept non-infectible by the suppression

of *Aedes aegypti* through efficient control measures like those developed in Brazil. The importance of keeping yellow fever out of the United States has been recognized and the necessary measures have been outlined in a report of the Yellow Fever Committee of the 1937 Conference of State and Territorial Health Officers with the Public Health Service. The measures recommended were: "Isolation of cases, surveillance of air travelers, control of *Aedes aegypti* in communities adjacent to airports of entry, and destruction of mosquitoes on airships." As recently published in the *Public Health Reports*,[14] Certificates of Origin are being required of air passengers embarking in potentially infected regions; planes are being systematically fumigated, with an efficient insecticide; and an officer of the U. S. Public Health Service is now engaged in vaccinating flying personnel against yellow fever with a vaccine devised and furnished by the International Health Division of The Rockefeller Foundation.

As long as yellow fever is kept out of the United States it may not be necessary for the laboratories of the State Boards of Health to enter upon any extensive study which would involve the maintenance of the virus and the immunization of the staff. It could reasonably be expected, however, that they would offer assistance to health officers in establishing the diagnosis in suspected cases. This help would consist of the transfer of virus to susceptible strains of mice by intracerebral inoculation of the patient's blood in the first 3 days of the disease, and also the taking of serum specimens as early as possible and again during convalescence for submission to a laboratory prepared to make protection tests.

These few examples illustrate the great and growing importance of the virus diseases to the public health. Some of the greatest discoveries in preventive medicine have been made in this field. Equal opportunities for advances seem to be looming for the future, but if they are to be realized within a reasonable time, the active participation of the health authorities is needed in the solution of the unsolved problems as well as in the application of accepted procedures.

REFERENCES

1. Rivers, T. M. Recent Advances in the Study of Viruses and Viral Diseases. *J.A.M.A.*, 107:206–210 (July 18), 1936.

2. Smith, W., Andrewes, C. H., and Laidlaw, P. P. A Virus Obtained from Influenza Patients. *Lancet*, 225:66–68 (July 8), 1933.

3. Francis, T., Jr. Epidemiological Studies in Influenza. *A.J.P.H.*, 27:211–225 (Mar.), 1937.

4. Francis, T., Jr., and Magill, T. P. The Antibody Response of Human Subjects Vaccinated with the Virus of Human Influenza. *J. Exper. Med.*, 65:251–259 (Feb.), 1937.

5. Rivers, T. M. Cultivation of Vaccine Virus for Jennerian Prophylaxis in Man. *J. Exper. Med.*, 54:453–461 (Oct.), 1931.

6. Goodpasture, E. W., and Buddingh, G. J. The Preparation of Antismallpox Vaccine by Culture of the Virus in the Chorioallantoic Membrane of Chick Embryos, and its Use in Human Immunization. *Am. J. Hyg.*, 21:319–360 (Mar.), 1935.

7. Rivers, T. M., and Ward, S. M. Jennerian Prophylaxis by Means of Intradermal Injections of Culture Vaccine Virus. *J. Exper. Med.*, 62:549–560 (Oct.), 1935.

8. Webster, L. T. Diagnostic and Immunological Tests of Rabies in Mice. *A.J.P.H.*, 26:1207–1210 (Dec.), 1936.

9. Stokes, A., Bauer, J. H., and Hudson, N. P. Experimental Transmission of Yellow Fever to Laboratory Animals. *Am. J. Trop. Med.*, 8:103–164 (Mar.), 1928.

10. Theiler, M. Studies on the Action of Yellow Fever Virus in Mice. *Ann. Trop. Med. & Parasitol*, 24:249–272 (July 8), 1930.

11. Soper, F. L. The Newer Epidemiology of Yellow Fever. *A.J.P.H.*, 27:1–14 (Jan.), 1937.

12. Theiler, M., and Smith, H. H. The Use of Yellow Fever Virus Modified by in Vitro Cultivation for Human Immunization. *J. Exper. Med.*, 65:787–800 (June), 1937.

13. Convention Sanitaire Internationale pour la Navigation Aerienne. *Bull. de l'Office Int. d'Hyg. Publique*, 25:931–950 (June), 1933.

14. Preventing the Spread of Yellow Fever through Air Traffic. *Pub. Health Rep.*, 52:1027–1030 (July 30), 1937.

Production and Use of Smallpox Vaccine Virus Cultivated in the Chorio-Allantoic Membrane of Chick Embryos*

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THE chorio-allantoic membrane of chick embryos was first used for the propagation of viruses in pure culture by Woodruff and Goodpasture [1] when they demonstrated its susceptibility to the virus of fowl-pox. Following this, Goodpasture, Woodruff, and Buddingh [2, 3] propagated the virus of vaccinia under the same conditions and suggested the use of this method for the production of smallpox vaccine for human vaccination. Goodpasture and Buddingh [4, 5, 6] continued this work and adapted the method for the production of smallpox vaccine on a scale large enough to prove practicable for this purpose. In a large series of comparative experiments they were able to show that vaccine virus propagated by this method yielded a vaccine free from bacterial contaminants which compared favorably in its pathogenicity, potency, keeping qualities, and as far as could be demonstrated, in its immunizing properties, with the virus grown in calves.

The experience gained to the present time with this method and the results obtained from the use of the vaccine from this source in human vaccination will be summarized in this report.

METHOD

A reliable source of fertile hen eggs is indispensable. Eggs from any of the standard poultry breeds can be used although we prefer brown shelled eggs from the larger types. The eggs are placed in a standard poultry incubator at regular intervals so as to have a constant supply of embryos on hand. Fourteen day old embryos are best suited for the cultivation of vaccinia virus. Before inoculation the incubated eggs are candled and the infertile ones and those containing dead embryos are discarded.

A square or triangular window is then made in the egg shell. This is most conveniently done by means of a small electric motor equipped with a flexible driving shaft and sliding chuck into which a small carborundum abrasive disk is fitted. The speed of the motor is regulated by a device operated with a foot treadle. No effort is made to sterilize the eggshells by means of

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disinfectants before cutting the window. By running the motor at a speed just sufficient to allow the disc to cut into the shell, a triangular cut, about 1 inch each way is made through the side of the eggshell. Care must be taken to cut through the eggshell only. The shell membrane must be left intact. The procedure can be easily mastered by a little practice. After the triangular cut has been completed it is covered with a thin layer of paraffin which is kept just at the melting point. With experience 30 or 40 eggs can be prepared at one sitting without injuring the embryos by too prolonged cooling.

The eggs are then placed in a separate laboratory incubator fitted with removable trays constructed of diamond shape mesh which provide adequate support and prevent them from rolling over. This incubator is kept at 37° C.

Exposure of the chorio-allantoic membrane is obtained by cutting through the shell membrane on two sides of the triangular cut with a sterile half spear point dissecting needle. The base of the triangle is left intact and serves as a hinge. Lifting up the shell flap at the apex by means of a sterile forceps or the dissecting needle the chorio-allantoic membrane lying directly beneath is exposed. The inoculum which may be in suspension or in small particles of previously infected material is then placed on the membrane. If small particles of inoculum are used they are picked up with sterile forceps and lightly rubbed over the entire exposed area. The shell flap is then dropped back into place and sealed with paraffin which is kept just above the melting point. The inoculated eggs are returned to the incubator and incubated for 72 hours at 37° C. and kept with the window side up.

At the end of this period the vaccinal lesion is easily recognized as an opaque area of thickened membrane or as a collection of pock-like nodules closely packed together. It is usually 2 to 4 cm. in diameter.

Removal of the virus is accomplished by making a cut with the dental motor entirely around the egg about one-third of the distance from the top. This cut is then covered with melted paraffin. With a sterile dissecting needle the shell membrane along this cut is separated and the entire top of the eggshell lifted off. In this way the vaccinal lesion in the membrane is exposed without contaminating it.

Before removal of the infected area in the membrane its entire surface is mopped with a sterile swab and the swabbing inoculated onto an agar slant. An agar plate, marked off in several sections can also be used for this purpose. Then with sterile scissors and forceps the lesion is cut away and placed in a separate Esmarck dish appropriately labeled for identification with the bacterial control. The lesions are stored in the refrigerator for 3 or 4 days, during which time the bacterial controls are incubated at 37° C.

Separate lesions vary from 0.5 to 2 gm. in weight. Those lesions which prove to be contaminated as shown by growth on the agar slants are discarded. The remainder are pooled in a covered sterile mortar which is surrounded by a freezing mixture of ice and salt. When thoroughly frozen they can be pounded into a fine pulp with a pestle. Grinding is continued until the material is completely thawed. The diluent which may be either 50 per cent glycerol in saline or sterile normal beef serum in proportions of 4 parts of diluent to 1 part of ground pulp by volume is then added. The suspension is stored in sterile containers and subjected to further bacteriological tests. When these prove satisfactory the vaccine is then put up in capillary tubes. The tubed vaccine is tested for potency on the rabbit.

Other methods of inoculating the membrane and of harvesting the vaccine have been suggested, but we feel quite confident that the method here outlined will insure the most constant and largest yield and will obviate the possibility of a low titratable potency due to insufficient takes.

BACTERIOLOGY

When ordinary aseptic precautions are observed at every step of the technic, contamination of the vaccine by bacteria is avoided with comparative ease. By inoculating agar slants with swabbings from the separate lesions, those which have become infected before removal can be eliminated and only sterile material is used for preparing vaccine. Contamination of the virus in the embryo occurs very rarely so that the loss of material from this source is negligible. The prepared vaccine is rigidly controlled for sterility. From each separate batch two agar plates are poured with 0.5 c.c. of the vaccine to test for the presence of aerobic organisms. After 4 days' incubation at 37° C. colony counts are made. The greatest majority of the batches are bacteria free. Counts as high as 5 colonies per c.c. are unusual. Tests for anaerobes are made by inoculating 2 deep meat infusion broth tubes sealed with paraffin with 1 c.c. each of vaccine and incubating for 10 days at 37° C. In all our experience no pathogenic anaerobic organisms have been encountered. An occasional batch of vaccine has been contaminated with anaerobic organisms. These batches, however, were grossly contaminated due to technical errors.

POTENCY AND KEEPING QUALITIES

The potency of the vaccine has always been tested by the method advocated by Leake and Force.[7] Rabbits are inoculated on the shaved and scarified skin with 0.4 c.c. of prepared vaccine in dilutions of 1–100, 1–1,000, 1–3,000, 1–10,000 over separate areas 2.5 x 5 cm. square. The requirements set by this method have been consistently met. Dilutions of 1–1,000 produce a confluent eruption and the 1–3,000 dilution produces an eruption in which the decrease in the lesion is not over 20 per cent of that produced by the 1–1,000 dilution.

When stored at 5° C. and below, either in the bulk or in capillary tubes, the potency of the glycerinated vaccine as tested on the rabbit and by human vaccination undergoes no appreciable diminution over a period of 1 year. It has been found to be viable and to produce good lesions in the lower dilutions in the rabbit after 3 years.

In both its potency and keeping qualities we have found it to compare favorably with calf vaccine.

PATHOGENICITY AND IMMUNIZING PROPERTIES

Comparative studies of the vaccinia developing in experimental animals and man following inoculation with the vaccine cultivated in the chick embryo and calf vaccine have been previously reported by us in detail.[6] In rabbits the lesions from the chorio-allantoic vaccine are slightly milder than from the calf vaccine. In man also a slightly milder reaction is observed. The evolution of the lesion following vaccination by either the single scratch or multiple pressure method is in every way typical in all its stages of vaccinia. General reactions such as fever and malaise and local induration of the subcutaneous tissue as well as glandular involvement is markedly less severe following the use of the chick vaccine as compared with calf vaccine.

Studies of the serological response in experimental animals and man as measured by the inhibitory effect of the immune serum have shown that the chorio-allantoic vaccine produces an

immunity as substantial as that following the use of calf vaccine.

Revaccinations performed with a potent calf vaccine in a small group of children which had been vaccinated with the chorio-allantoic vaccine 2 years previously resulted in immune reactions in each case. We have had no opportunity to test the immunity in man over longer periods of time.

In a series of 1,120 vaccinations performed under field conditions in school children of which 916 were primary vaccinations we obtained 93.6 per cent positive reactions. This compares favorably with the calf vaccine commonly in use.

EFFECT OF CONTINUOUS PROPAGATION IN THE MEMBRANE ON THE VIRUS

During the past 5 years we have propagated a dermal strain of vaccine virus through 220 successive generations in serial transfer without intervening mammalian passage. Constant control and testing of the vaccine for its potency and study of the lesions produced in animals and man indicate that it has not been altered in its essential characteristics. Vaccine prepared from the 220th generation has the same titratable potency for the rabbit as the original calf vaccine with which we started.

The lesions in man are typical of vaccinia in every respect. Careful study of the histology of the lesions produced in the chorio-allantoic membrane as well as the keratitis following inoculation of the rabbit cornea show that the pathogenic properties of the virus as evidenced by the presence of the typical intracellular inclusion bodies and the specificity of the reaction have been maintained. Intervening passage through rabbits and other animals as generally followed in the production of vaccine virus from the calf does not seem to be necessary when the chick embryo is used.

USE OF DILUENTS OTHER THAN 50 PER CENT GLYCEROL IN SALINE

It is well known that glycerinated vaccine virus loses its potency rapidly when submitted to temperatures higher than 5° C. At 37° C. it is found to lose its viability completely in 10 to 12 days. This factor has always presented a great problem during transportation and the use of the vaccine in the field where refrigerator temperatures cannot be maintained. With a bacteria free vaccine it has been possible for us to investigate the use of other diluents, preferably of a colloidal nature, which would protect the virus against the deteriorating effect of relatively high temperatures.[8]

This has heretofore not been possible with calf vaccine since the bacterial contaminants were liable to multiply rapidly when suspensoids other than 50 per cent glycerol were used. Of numerous substances investigated it was found that normal inactivated rabbit or beef serum, preferably the latter for practical reasons, could be used as a substitute for 50 per cent glycerol in dilutions of 4 parts of serum to 1 part the ground pulp. Such vaccine when stored at 37° C. for 6 weeks still produces a positive reaction when inoculated in the undiluted suspension on the scarified rabbit skin.

The vaccine suspended in beef serum and put up in capillary tubes when submitted to the actual field tests during the hot months of July and August by 285 vaccinations in school children produced 92 per cent positive vaccinations as compared with 232 vaccinations performed with glycerinated vaccine from the same source which produced 79.7 per cent positive reactions.

After 4 days' storage at 37° C. the serum-vaccine still produced 94 per cent positive reactions in a small number of school children and after 7 days at this temperature 35 per cent positive reactions were still obtained.

The substitution of sterile normal inactivated beef serum for 50 per cent glycerol as a diluent for vaccine virus propagated in the membrane of chick embryos seems to offer a great improvement in its keeping qualities and resistance to high temperatures. This should be of special value for its use in tropical climates.

DISCUSSION

The chorio-allantoic membrane of chick embryos provides a uniform living medium for the propagation in pure culture of the virus of vaccinia. The intracellular environment which the virus requires for its growth is found chiefly in the epithelial cells of the ectodermal layer. The virus proliferates rapidly so that within 72 hours after inoculation a lesion develops which is large enough to make the production of smallpox vaccine a practicable procedure. Continuous culture in serial transfer from embryo to embryo through numerous generations over a long period of time has not altered the characteristics of the virus. Intervening mammalian passage does not seem to be necessary to keep up its virulence. Careful study has convinced us that the affinity of a dermal strain of virus for epithelial cells is maintained if not enhanced. Since many strains of vaccinia virus have the capacity to infect cells of mesodermal origin, a strain of virus in which the epitheliotropic character is the predominant one should be of practical as well as theoretical importance. The milder character of the lesion in man following vaccination with the chorio-allantoic virus is probably due to this fact. The infection is predominant in the epithelial cells of the skin. The subcutaneous tissues are involved only slightly as compared with the infection following the use of many of the strains derived from the calf. The slightly milder infection has as far as we have been able to determine not affected the immunity response on the part of the vaccinated individual.

It is well known that the chorio-allantoic membrane contains no nervous tissue. The possibility of any enhancement or acquisition of predilection of the virus for nervous tissue is greatly minimized by this circumstance. Although the mechanism of complications involving the nervous system which on rare occasions follow smallpox vaccination is not clearly understood and the virus of vaccinia has not definitely been shown directly to be implicated, this factor is nevertheless worthy of consideration.

Analysis of the serological response as well as revaccinations with potent calf virus indicate that the resulting immunity is as substantial as that induced by virus from the calf.

By this method, a smallpox vaccine can be prepared which is free from bacterial contaminants. No elaborate equipment or complicated technic is required to obtain this result. If the simple precautions previously outlined are followed, contamination is easily avoided and the loss of material from this source is negligible.

Where a constant supply of fertile eggs is available smallpox vaccine can be produced throughout the entire year. Since long periods of storage in glycerol and the addition of bactericidal agents is not required the vaccine can be issued for use immediately after its preparation and sterility control. This should assure a highly active and potent vaccine from which a high percentage of positive reactions may be obtained.

From our experience with the use of normal inactivated beef serum as a diluent for vaccine virus, propagated in the chick embryo membranes, we would recommend its substitution for 50 per cent glycerol. Its protective action for the virus against high temperature is

of a distinct advantage and at least should prevent deterioration of the virus during transportation in the field. For long periods of storage refrigerator temperature is required. It should be of great use in tropical climates.

The multiple pressure or scratch method of vaccination can be used with the chorio-allantoic vaccine with equal effectiveness. Since it is free from bacterial contamination there should be no objection to its use by cutaneous injection.

We believe that culture of vaccinia virus in the chorio-allantoic membrane of chick embryos offers a relatively simple and economically practicable method for the production of a bacteria-free smallpox vaccine. It eliminates many of the objectionable features associated with the time honored calf vaccine and should remove many popular prejudices which have arisen against vaccination on that account. Our experience with the use of chorio-allantoic vaccine for human immunization is relatively limited although our findings thus far have discovered no contraindications to its continued and increased use. Reports on the experience of others who have been using or intend to use this type of vaccine should be very valuable information upon which judgment could be made as to its merits or disadvantages.

REFERENCES

1. Woodruff, A. M., and Goodpasture, E. W. The Susceptibility of the Chorio-allantoic Membrane of Chick Embryos to Infection with the Fowlpox Virus. *Am. J. Path.*, 7:209–221, 1931.

2. Goodpasture, E. W., Woodruff, A. M., and Buddingh, G. J. The Cultivation of Vaccine and Other Viruses in the Chorio-allantoic Membrane of Chick Embryos. *Science*, 74:371–372, 1931.

3. Goodpasture, E. W., Woodruff, A. M., and Buddingh, G. J. Vaccinal Infection of the Chorio-allantoic Membrane of the Chick Embryo. *Am. J. Path.*, 8:271–281, 1932.

4. Goodpasture, E. W., and Buddingh, G. J. Human Immunization with a Dermal Vaccine Cultivated on the Membranes of Chick Embryos. *Science*, 78:484–485, 1933.

5. Goodpasture, E. W., and Buddingh, G. J. Immunization de l'homme par un vaccin dermique cultive sur les membranes de l'embryon de poulet. *Bull. Mens. de l'Off. Int. d'Hyg. Publ.*, 26:1226, 1934.

6. Goodpasture, E. W., and Buddingh, G. J. The Preparation of Antismallpox Vaccine by Culture of the Virus in the Chorio-allantoic Membrane of Chick Embryos, and Its Use in Human Immunization. *Am. J. Hyg.*, 21:319–360, 1935.

7. Leake, J. P., and Force, J. N. A Method for Estimating the Potency of Smallpox Vaccine. *Bull. Hyg. Lab., U.S.P.H.S., No. 149*, 1927.

8. Goodpasture, E. W., and Buddingh, G. J. The Protective Action of Rabbit Serum for Vaccinia Virus at High Temperatures. *Science*, 84:66–67, 1936.

Etiological and Serological Studies in Epidemic Influenza*

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PRIOR to the onset of the influenza epidemic of 1936–1937, much of the evidence which related influenza virus to epidemic influenza of man was inferential. Attempts to determine the incidence of virus infection in the course of an epidemic had not been thoroughly carried out. Furthermore, while it had been demonstrated that in certain instances an increase in antibodies neutralizing influenza virus followed clinical infection,[1, 2] the frequency with which this phenomenon was associated with the actual presence of virus in the throat of the patient was not known. Technics, new or improved, were developing but had not been sufficiently applied to permit their evaluation except in the most marked instances. The significance of negative tests could only be surmised. Thus the failure to recover influenza virus from the epidemic of respiratory disease which occurred throughout the United States in the early months of 1936 [3] and the fact that the convalescents did not develop antibodies to influenza virus could only tentatively be taken as evidence that a different disease had been prevalent.

The recent epidemic afforded the opportunity to test the applicability of different procedures to the diagnosis and study of epidemic influenza. The limitations and variations of results could be observed and the data applied to correlative interpretation of the different procedures.

Accordingly, specimens of blood, throat washings, or both, were obtained from 120 patients suffering with respiratory infections during the epidemic period from December, 1936, to March, 1937. The cases were divided among 7 institutions in Metropolitan New York, 1 institution in Tallahassee, Fla., and 1 satisfactory specimen was obtained from San Francisco, Calif. The results of studies in one group of 28 patients have been presented elsewhere.[4] The present report comprises an analysis and summary of the studies of the entire series together with an

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interpretation of the results of the various tests when viewed in the presence of one another.

METHODS

DEMONSTRATION OF VIRUS IN RESPIRATORY TRACT OF PATIENT

Since the recovery of influenza virus from the respiratory tract of a patient constitutes *prima facie* evidence of the nature of the illness, attempts were made in a high percentage of cases to determine, if possible, the presence or absence of influenza virus in the nasopharyngeal washings. The washings were instilled into the nostrils of an anesthetized ferret and subsequently one or both of the following procedures were employed:

1. Suspensions were made of the lung and nasal scrapings of the inoculated ferret and serial transfers made to normal ferrets, after which the virus was established in mice and identified.

2. The inoculated ferret was allowed to recover, and 10 to 14 days after the instillation of the patient's washings, the ferret was bled from the heart. The serum of the recovered ferret was then tested against a known strain of epidemic influenza virus to determine the presence or absence of specific neutralizing antibodies.

In 4 of 6 instances in which attempts were made, the virus was established directly in mice by nasal instillation of washings from the patient's throat, and subsequent serial passages with suspensions of lungs of the inoculated mice.[4, 5] In certain instances filtered throat washings were introduced into tissue culture medium and successive transfers made. With other samples the filtered material was introduced on the chorio-allantoic membrane of the developing egg to attempt direct propagation of virus.[6] The two latter procedures were discontinued after trial since too long a period ensued before virus could be satisfactorily demonstrated without recourse to animal inoculation.

SEROLOGICAL TESTS FOR DEMONSTRATION OF ANTIBODIES

A. *Neutralization or Mouse Protection Test*—Blood was obtained from patients, so far as possible, in the first 3 days of acute illness and again after 3 to 4 weeks. The acute and convalescent sera were tested at the same time for their capacity to protect mice against fatal infection with 1,000 lethal doses of the known P.R. 8 strain[7] of epidemic influenza virus. Undiluted serum and dilutions of serum 1:5, 1:10, 1:20, 1:40, 1:80 and 1:160 in saline were used. Fresh suspensions of infected mouse lung were made in 10 per cent horse serum-saline. To 0.3 c.c. of the serum dilution was added 0.3 c.c. of 0.2 per cent virus suspension. After thorough mixing, the mixtures were incubated at 37° C. for 30 minutes. Three anesthetized Swiss mice were inoculated intranasally with 0.05 c.c. of a serum-virus mixture from a 0.25 c.c. tuberculin syringe. The mice were observed for a period of 10 days, at which time the experiment was concluded. The day of death of each mouse was recorded and the titer of the serum was considered to be the point at which 50 per cent of the mice in the series would be protected.[8] Thus, if all the mice receiving virus and serum in a dilution of 1:40 survived while those receiving virus and serum in a dilution of 1:80 died, the titer would be considered to be 1:60. All titers were recorded in terms of the final dilution of serum. When mice receiving a mixture of virus and the highest dilution of serum (1:320) survived, an arbitrary end-point of 1:640 was given.

At the time of each test a known positive human serum was titrated so as to determine whether gross aberration from the usual had occurred. There was a surprising constancy in the titer of the control serum in different tests, but no attempt was made to record the test sera in terms of

the control as described by the English investigators.[9]

Titrations of the potency of the virus were made with each test. In general the mice receiving the 10^{-6} dilution of virus died while the 10^{-7} dilution was not fatal. Thus the inoculum (0.1 per cent) in the serum tests was 1,000 lethal doses.

One other point was carefully observed. Mice, 4 to 5 weeks of age, from the same breeder were used throughout. This precaution, together with the comparative uniformity of the virus titer and the simultaneous testing of the sera to be compared, resulted in a test capable of repetition within a comparatively close range of constancy.

B. *Complement-fixation Test* — For the purpose of studying antibody titers to influenza virus by means of the complement-fixation test, a procedure similar to that described by Fairbrother and Hoyle[10] was used. The antigen was prepared in a different manner, however. Lungs were removed from 100 to 200 mice infected with the P.R. 8 strain of epidemic influenza virus at or about the time of death. The lungs were ground in physiological salt solution to make a 10 per cent suspension. After centrifugation for 30 minutes at 3,500 revolutions per minute, the supernatant fluid was removed and 10 c.c. amounts were transferred to tightly stoppered vials. The vials were then placed in a thermos at —80° C.[11] When needed for a test, the material was removed from the freezing mixture, thawed, centrifuged lightly, and then diluted to 2 per cent concentration for use. In this range the virus antigen was never anticomplementary. By the procedure described, antigen of uniform strength can be prepared in sufficient quantities to last over a considerable number of tests.

Serum was diluted with physiological salt solution in twofold dilutions up to 1:128.

Guinea pig complement so diluted that 0.1 c.c. contained 2 units was employed.

The hemolytic system comprised 5 per cent suspension of sheep's washed erythrocytes sensitized with rabbit amboceptor. The amboceptor was titrated against 0.1 c.c. amounts of cell suspension; equal volumes of the dilution of amboceptor containing 2 units per 0.1 c.c. and 5 per cent washed cells were mixed.

The reagents were added in the following order:

0.25 c.c. serum
0.15 c.c. complement (3 units)
0.25 c.c. antigen
0.35 c.c. saline

The mixtures were incubated in the water bath at 37° C. for 60 minutes for fixation; 0.5 c.c. of sensitized cells was added and the mixtures were incubated 45 minutes. Final readings were made at that time. Anticomplementary controls of 1 or more dilutions of each serum were always included. The end point was taken as the last tube in which fixation was present. With the test as employed, the end points were rather sharp, fixation infrequently occurring more than 1 tube beyond that in which +++ or ++++ fixation was last observed. All readings were recorded in terms of final dilutions of serum in order to conform with the neutralization test.

Acute and convalescent sera from the same person were included in the same test and a control serum of known titer was always tested for the sake of comparison with other tests. New antigen was always standardized in a similar manner.

THE RECOVERY OF VIRUS

Throat washings (in 2 cases, postmortem lung specimens) from 75 pa-

TABLE I

Summary of Studies in 120 Patients with Respiratory Disease During Epidemic of Influenza

Group No.	Number of Cases	Classification	Average Serum Antibody Titer			
			Neutralization Test		Complement-fixation Test	
			Acute	Convalescent	Acute	Convalescent
I	41	Virus recovered Rise in serum antibodies	22.4	235.0	14.4	142.5
II	1	Virus recovered No rise in serum antibodies	12.5	15.0	64.0	64.0
III	9	Virus recovered No serum tested				
IV	9	No virus recovered Rise in serum antibodies	20.0	292.0	14.0	309.0
V	18	No test for virus Rise in serum antibodies	14.8	340.0	15	405.3
VI	11	No virus recovered No rise in serum antibodies	50.4	43.2	40.7	24.2
VII	2	No test for virus	80	140	32	32
		No rise in serum antibodies	15	15	32	16
VIII	13	No test or negative test for virus Acute serum obtained late	185.7	231.9	416	357
IX	8	Convalescent serum only	.....	123	...	344
X	5	Incomplete or unclassified				

Total of 117 listed is due to the fact that the throat washings of 3 patients were pooled with others.

tients were tested by ferret inoculation for the presence or absence of influenza virus. Of these, 52 samples were found to contain the virus of epidemic influenza even though many of the specimens had been stored for a considerable period before testing. From 23 of the patients strains of virus were established in mice; 4 by direct transmission, 1 after primary isolation in tissue culture medium, the remainder after intermediate ferret passage. In general, little difficulty was encountered in transferring the disease to mice, much less than had been the case with some of the strains from other epidemics.

The virus recovered was in each instance human influenza virus; the virus was neutralized by serum of animals immune to the P.R. 8 strain but not by swine influenza serum. Thus, it is shown that the primary etiological agent of the epidemic of respiratory disease was the virus of epidemic influenza.

SEROLOGICAL STUDIES

Samples of serum were obtained from 106 patients. From 96 of these patients, serum was secured during the acute period of illness and again in the third week of convalescence. Examination of throat washings for the detection of virus and titrations of antibodies in the patient's acute and convalescent sera were done in 65 cases.

TABLE II

Serological Reactions in Patients with Respiratory Disease

Case No.	Lab. No.	Day of Disease	WBC in 1,000	Past History	Titer of Neutralizing Antibodies: Acute Serum	Titer of Neutralizing Antibodies: Convalescent Serum	Titer of Complement-fixing Antibodies: Acute Serum	Titer of Complement-fixing Antibodies: Convalescent Serum	Diagnosis and Remarks
		Group I—Virus in Throat Washings—Positive Serological Reactions							
1	BL-1	2	5.8		6	280	16	256	Epidemic influenza
5	BL-5	1	9.0	1926	40	70	8	16	"
6	BRK-1	2	10.0	Neg.	0	140	0	256	"
8	BRK-3	2	5.5	Neg.	6	200	0	128	"
11	TF	1	7.3	1923	15	400	..	...	"
12	BRK-7	3	5.4		15	640	8	256	"
26	BRK-28	1	5.2	1918	15	640	8	512	"
28	BRK-34	2	...	1936 ?	30	200	64	128	"
33	BRK-39	2	...	?	40	120	0	8	"
34	BRK-40	2	...	1918, 1936	4	100	8	16	"
38	NYH-3	3	6.9	Neg.	0	15	8	64	"
39	NYH-4	2	5.0	Neg.	6	100	16	64	"
40	NYH-5	3	5.6	Neg.	6	225	0	128	"
45	NYH-10	2	8.6	Pneumonia, 1933	200	640	8	64	"
47	NYH-12	3	7.4	Neg.	50	640	16	128	"
48	NYH-13	1	3.4	1918	50	320	0	64	"
49	NYH-14	2	4.8	Neg.	4	218	0	128	"
50	NYH-15	3	8.5	Neg.	30	100	0	64	"
51	NYH-16	2	6.7	1931, 1933	15	640	0	128	"
54	NYH-19	2	6.1	Neg.	0	35	8	512	"
55	NYH-20	3	6.2	Neg.	6	50	16	64	"
56	NYH-21	2	5.8	Neg.	0	35	32	64	"
57	NYH-22	2	7.8	Neg.	10	60	8	128	"
58	NYH-23	4	3.5	1928	30	206	32	128	"
59	NYH-24	3	3.3	Neg.	4	103	8	128	"
61	NYH-26	3	8.0	1918	15	100	0	16	"
62	NYH-27	3	3.8	1918	6	240	8	128	"
63	NYH-28	3	5.6	Neg.	30	240	8	128	"
65	MET-2	1		1918	15	640	16	512	"
66	MET-3	1		1918, 1935	16	60	0	32	"
67	RIH-1	3	4.2		0	35	32	64	"
72	RIH-6	2	5.5	Neg.	6	140	8	256	"
74	HH-1	4	8.3	1918, 1927	120	200	16	32	"
75	HH-2	4	5.5	Yes	0	25	0	256	"
78	RI-10	3	6.5	1929	12.5	100	8	32	"
79	LTC	1	8.3	Neg.	20	200	8	32	"
80	WC	2			0	15	8	64	"
81	ERR	0		1918, 1933	30	70	8	16	"
88	FLA-7	3	4.0		8	100	64	256	"
93	FLA-12	4	5.4		35	640	0	512	"
99	FLA-18	4?	6.0		30	640	512	1,024	History inaccurate
Average		2.3*	5.9		22.4*	234.7*	14.4*	142.5*	
* (Exclusive of No. 99)									
		Group IV—No Virus in Throat Washings—Positive Serological Reactions							
9	BRK-4	3	7.2		30	640	16	256	Epidemic influenza
27	BRK-32	2	7.8	Neg.	8	640	8	512	"
30	BRK-36	1	9.1	1918, 1933	12.5	280	32	512	"
36	NYH-1	3	6.8	1918	6	50	0	32	"
37	NYH-2	2	4.1	Neg.	4	160	32	128	"
42	NYH-7	4	4.0	1918	100	280	16	256	"
44	NYH-9	2	4.5	Neg.	15	120	8	32	"
82	FLA-1	4			6	320	8	1,024	"
105	FLA-24	3			8	640	8	32	"
Average		2.7			20	292	14	309	

(Table continued on next page)

TABLE II—(Continued)

Serological Reactions in Patients with Respiratory Disease

Case No.	Lab. No.	Day of Disease	WBC in 1,000	Past History	Titer of Neutralizing Antibodies: Acute Serum	Titer of Neutralizing Antibodies: Convalescent Serum	Titer of Complement-fixing Antibodies: Acute Serum	Titer of Complement-fixing Antibodies: Convalescent Serum	Diagnosis and Remarks
		Group V—No Throat Washings Tested—Positive Serological Reactions							
15	BRK-13	2	8.0		17.5	640	0	128	Epidemic influenza
16	BRK-14	2	11.2		15	640	..	512	"
18	BRK-16	3	10.4	1918	6	640	0	128	"
19	BRK-17	3		1918	6	60	8	64	"
20	BRK-18	3	10.2	1918	0	30	0	256	"
21	BRK-18A	4	5.1	?	17	80	32	128	"
24	BRK-20	4	5.4	1918	60	640	8	128	"
25	BRK-21	2	7.6	?	6	640	0	1,024	"
29	BRK-35	2	...	?	0	640	0	1,024	"
41	NYH-6	3	...	1918	6	225	16	256	"
46	NYH-11	4	...	1918	30	240	16	128	"
73	RIH-7	2	7.3	?	6	640	16	1,024	Type III Pneumococcus bronchitis
85	FLA-4	4	...		0	35	32	128	Epidemic influenza
87	FLA-6	5	11.0		4	60	32	512	"
94	FLA-13	4	6.5		70	320	32	256	"
95	FLA-14	4	6.0		15	80	8	128	"
100	FLA-19	4			0	640	32	1,024	"
111	RIH-10	1			6	70	8	64	"
Average		3.1			14.8	340	15	405.3	
		Group VI—No Virus in Throat Washings—Negative Serological Reactions							
32	BRK-38	3		Neg.	8	13	0	8	Not influenza
43	NYH-8	2	12.6	Neg.	30	30	8	8	Strep. throat
52	NYH-17	3	25.0	Neg.	60	50	32	32	"
53	NYH-18	2	12.0	Neg.	100	100	32	32	"
60	NYH-25	5	4.8	Neg.	0	0	0	0	Afebrile sinusitis
76	RIH-8	6	13.1	Multiple	15	17	32	32	Bronchitis
77	RIH-9	3	10.3	1918, 1931, 1936	107	35	64	64	Mild coryza
108	LV-2	5			25	17.5	32	32	Not influenza
112	RIH-11	2	7.5	1934	60	60	16	16	Proven case 1934
70	RIH-4	3	21.9	1918, 1936	120	70	256	64	Strep. tracheitis
89	FLA-8	9	8.5		30	60	8	8	Not influenza
Average		4			50.4	43.2	40.7	24.2	
		Group VII—No Throat Washings Tested—Negative Serological Reactions							
31	BRK-37	1	13.4	?	80	140	32	32	Not influenza
102	FLA-21	5			15	15	32	16	
		Group VIII—Patients Seen Late in Disease—Positive Serological Reactions							
68	RIH-2	9	17.0	Neg.	60	60	512	128	Atypical pneumococcus pneumonia
69	RIH-3	9	10.9	Neg.	200	70	1,024	512	Acute bronchitis
71	RIH-5	7	9.7; 18.0	?	125	125	32	32	Atypical Type V pneumonia
83	FLA-2	6	4.7		30	200	128	256	
84	FLA-3	6	9.0		60	120	128	256	
86	FLA-5	9	6.0		280	240	1,024	512	
90	FLA-9	9	5.6		100	400	128	256	
92	FLA-11	6			0	240	128	512	
96	FLA-15	6	8.0		103	240	128	256	
97	FLA-16	5+			640	640	512	512	Relapse
98	FLA-17	4+	6.2		120	240	128	128	"
101	FLA-20	11			640	240	1,024	256	
104	FLA-23	8			60	200	512	1,024	
Average		8			185.7	231.9	416	357	

(Table continued on next page)

TABLE II—(Continued)

Serological Reactions in Patients with Respiratory Disease

Case No.	Lab. No.	Day of Disease	WBC in 1,000	Past History	Titer of Neutralizing Antibodies: Acute Serum	Titer of Neutralizing Antibodies: Convalescent Serum	Titer of Complement-fixing Antibodies: Acute Serum	Titer of Complement-fixing Antibodies: Convalescent Serum	Diagnosis and Remarks	Titer 3 Months Later: Neutralization Test	Titer 3 Months Later: Complement-fixation Test
Group IX—Only Convalescent Serum Obtained—Positive Serological Reactions											
91	FLA-10	8	4.8				512				
103	FLA-22	5					1,024				
115	BRK-26	35	6.2		120		128			120	16
116	BRK-23	30	6.7		240		256			240	128
117	BRK-25	35	16.7		35		256			35	64
118	BRK-24	40	8.4		240		256			240	64
119	BRK-22	33	11.2		35		64			35	0
120	BRK-33	18	9.6		70		256			50	128
Average						123		344		120	66.6

In the great majority of instances the first sample of serum was taken before the 5th day after onset, but in 13 the first serum was not obtained until the 6th day or later. So far as possible, with each specimen of serum parallel titrations of antibody content were made by means of the protection test in mice and by the complement-fixation test. Since a large percentage of the cases studied serologically were also investigated for the presence of influenza virus in the throat, the significance of the various results was more readily established. The results are summarized in Table I and presented in detail in Table II.

RESULTS OF SEROLOGICAL TESTS IN RELATION TO THE RECOVERY OF VIRUS

Titrations were made with the acute and convalescent sera of 42 patients in whose throat washings influenza virus was found. In 41 instances (Group I) a rise in the antibody content of the convalescent serum over that of the acute serum was observed. The average titer of neutralizing antibodies in the acute sera was 22.4 and in the convalescent sera, 235. The average titer of complement-fixing antibodies was 14.4 for the acute sera, 142.5 for the convalescent. With both tests the average increase in titer was approximately tenfold. In only one case, a patient who experienced characteristic symptoms but had no fever (Group II), was virus recovered without a corresponding rise in antibodies. Since the first group of 41 patients comprises only individuals in whom the virus was clearly shown to be present, tests made with the serum of these subjects represent the serological reactions of established cases of epidemic influenza. The uniform rise in antibodies in convalescence and the individual variations observed afford a satisfactory basis for the interpretation of the results obtained with material from other patients.

From throat washings of 9 patients (Group III), virus was recovered but no serum was obtained for serological studies.

In 9 cases (Group IV), virus was not recovered from the throat wash-

ings but the serological tests yielded results which conformed with those observed in patients whose throat washings contained influenza virus. The average titer of neutralizing antibodies in the acute sera was 20, in the convalescent sera 292. With the complement-fixation test, the average acute titer was 14.2, the average convalescent titer, 309.3. In each instance a sharp rise in titer occurred. Seven of the specimens of throat washings from these 9 patients had been kept in storage for 6 weeks to 4 months while the other 2 arrived by mail and contained heavy bacterial growth. Despite the fact that no virus was demonstrated, the striking increase which occurred in antibody titer appears to warrant the diagnosis of epidemic influenza in these cases.

From a series of 18 patients (Group V), throat washings were not available for study. Samples of acute and convalescent serum from each patient were examined serologically, however. The average titers by neutralization test for the acute and convalescent sera were 14.8 and 340, respectively; by the complement-fixation test, 15 and 405.3, respectively. In this series again the rise in antibodies is of sufficient degree to permit the assumption that the responses were the result of infection with the virus of epidemic influenza.

In the first group of patients presented above a diagnosis of epidemic influenza was based primarily upon a demonstration of the influenza virus in the patients' throats. When the antibody titers of the same patients were determined, a distinct sequence of events was noted. Following recovery from the virus infection the antibody titer of the convalescent serum had increased on the average to 10 times the height observed in the serum obtained during the acute illness. Applying the standards afforded by those studies, it was possible to interpret the results of serological tests made with the serum of certain patients whose throat washings failed to yield virus or from whom no throat washings were available. Because of the similarity of the serological findings in both groups, it was concluded that the latter individuals had also suffered from epidemic influenza.

In contrast to the preceding groups is a series of 11 patients (Group VI) from whose throat washings virus was not recovered and in whom, moreover, the serological tests gave quite different results. The average acute and convalescent titers as determined by the neutralization test were 50 and 43, respectively, and with complement-fixation test, 40 and 24, respectively. In only 1 patient (No. 32) was an increase noted by both tests and this was well within the limit of error. In the majority of the others the acute and convalescent titers were almost identical. Of this group, 4 suffered from hemolytic streptococcus infections. One of these had been ill 3 weeks previously and possessed a high titer of antibodies when observed in the present illness, suggesting that the earlier illness had been influenza. Three of the patients suffered from rather prolonged respiratory affections with low grade fever. One of them (No. 112) had a proven case of epidemic influenza in 1934; 2 additional attacks of mild respiratory disease had occurred in the interval. The antibody titer of the serum showed a marked rise after the first illness but when tested before and after the other episodes remained constant. Nor was it influenced by the present illness.

It appears then that these patients from whom no virus was recovered did not respond serologically in a manner similar to that of established cases of epidemic influenza. The fact that the comparatively low titers of the acute

sera remained low and, in most instances, identical in convalescence is significant. The completely negative evidence appears to justify the conclusion that the causative agent of illness in these patients was not the virus of epidemic influenza. Quite striking is the fact that 4 of them were hemolytic streptococcus infections which occurred in the midst of the influenza epidemic but with no evidence that they were etiologically related in any way to the epidemic. The entire group represents cases of respiratory infection occurring at the same time as an influenza epidemic which etiological and serological studies combine to identify as of a different nature. Similar conclusions were drawn regarding 2 patients (Group VII) in whom only serological tests were done. No significant differences were observed between acute and convalescent antibody titers.

In contrast to the patients observed early in the disease, whose sera showed a marked rise in antibodies following recovery, is another series of 13 patients (Group VIII) who were first seen 6 to 11 days after onset. From 3 of them throat washings were tested, but no virus could be demonstrated. The outstanding difference between the results obtained in these cases and those previously mentioned lay in the fact that the antibody titer of the first serum sample was in general as high as that of the usual convalescent serum. Thus, by neutralization test the average acute and convalescent titers were 186 and 232, respectively, and by complement-fixation test, 416 and 357, respectively. The high titers observed in the supposedly "acute stage" serum indicate that these subjects were in fact serologically convalescent from epidemic influenza. It is impossible to state whether the illness from which the patient was suffering at the time of observation was a prolongation of the attack of influenza although this is suggested in 3 cases which were diagnosed tentatively to be cases of atypical pneumonia. Two other patients were suffering from what were termed relapses. Among the remainder, the first serum specimens were obviously obtained after recovery had begun and they should probably, therefore, be considered to represent early convalescence. This is further emphasized by the demonstration that the second specimen of serum obtained 3 to 4 weeks later from the same cases showed no prominent increase in complement-fixation titer, which in 7 of the 13 remained unchanged at a high level or had decreased. The titer of neutralizing antibodies increased to some extent in 7 instances, and the results suggest that in general a high titer of antibodies is detected earlier with complement-fixation than with the neutralization test.

Finally 12 cases are included concerning which the data are incomplete. Two of the specimens were of lung obtained at autopsy from cardiac patients who suddenly developed fever and exaggerated pulmonary symptoms during the epidemic and died. From one of the lung specimens, after repeated ferret passage, virus was recovered. From 2 patients the only specimen was serum obtained during the acute illness. One patient (No. 35) is unclassified although considered negative. From the remaining 8 patients (Group IX) only convalescent serum was obtained. The average titer of neutralizing antibodies in these sera was 123, of complement-fixing antibodies, 344. While it is impossible to be conclusive, the antibody titers of the sera were sufficiently high, but for 1 doubtful case, to permit their inclusion with the specific convalescent sera.

EVALUATION OF SEROLOGICAL TESTS

While on the average the antibody titer of the convalescent serum was

10 to 20 times greater than that of serum taken during the acute illness considerable variation occurred in the antibody responses of different individuals to infection. The tests in a group of 62 cases from which the acute specimens of serum were definitely obtained in the first 4 days of the disease were analyzed with the assistance of Dr. Hugo Muench to determine what correlations could be drawn between the original and convalescent titers as measured by the neutralization test in mice and by complement-fixation technic. The distribution of the results is shown in Figures I and II. The extent to which the titer will increase following infection is not predictable by either method. Of the 62 acute sera, however, only 7 possessed neutralizing antibodies in a concentration greater than 1:40. The titers of these latter sera were 50, 50, 50, 80, 100, 120, and 200, respectively. In fact, only 20 of the 62 acute sera possessed neutralizing titers higher than 1:15. On the other hand, among the convalescent sera all but 8 had titers higher than 1:40 (15, 16, 17.5, 20, 30, 35, 35, 35) and 7 of these 8 results were in patients whose acute serum possessed no neutralizing capacity. The convalescent titer in 35 instances was greater than 1:128 and in 15 the limit of titer, 1:640, was reached.

FIGURE I

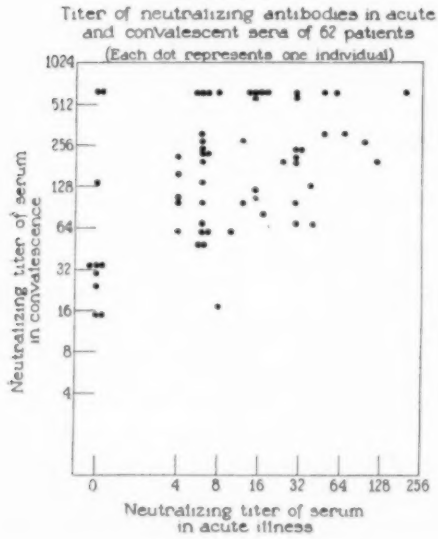
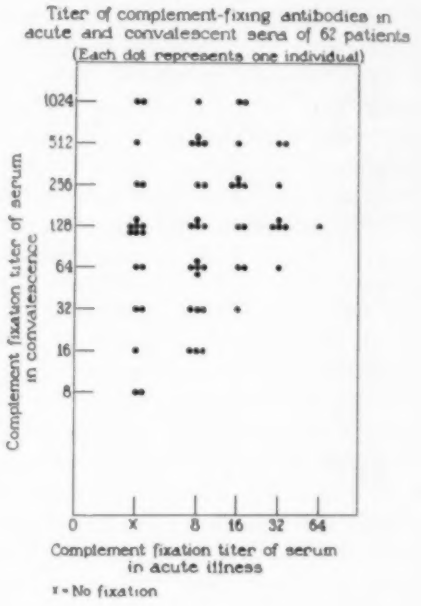


FIGURE II



Similar results were obtained by means of the complement-fixation test. The titers of 19 of the 62 acute sera were negative (less than 1:8), 22 possessed titers of 1:8, while only 1 reached a titer of 1:64. In convalescence 2 of the sera titered 1:8, 4 titered 1:16, 6 titered 1:32. The remaining 50 sera all possessed complement-fixing properties in the presence of influenza virus to a titer of 1:64 or greater, 5 of them reaching titers of 1:1,024.

It appears from the results of the parallel tests that a critical antibody level is reached somewhere in the range of 30–40. Over 85 per cent of the acute sera fall below this level, while of the convalescent sera approximately the same percentage has titers higher than 1:30. With either test the convalescent sera of low titer were from

patients whose antibody titer was at the lower limits of mensuration during the acute illness.

The mean proportionate increase in antibody titer measured by the two serological tests has a positive statistical correlation, emphasizing the tendency to parallelism of the results. The individual variation is pronounced, however, and a marked rise in antibodies by the protection test may occur with only a mild or moderate rise in complement-fixing antibodies. There is, nevertheless, a tendency for the sera of the individuals having high original titers to have a smaller logarithmic increment of antibody development in convalescence.

In certain instances the classification of the serum as positive might be questioned if the results of only one test had been relied upon, but with the additional data at hand it has been possible more clearly to evaluate the variations in the individual cases than it would have been had only one test been used. The results demonstrate as with all other immune processes that while in general a sharp response to the immunogenic agent occurs, certain individuals respond meagerly. The extent of the response appears to be related more to the peculiarity of the individual than to any measurable factor such as the severity of disease or a preëxisting antibody level.

SEROLOGICAL STUDIES IN NORMAL CONTACTS

Two cases (Nos. 79 and 81) have been recorded [4] in which the patients exhibited such minimal evidence of disease as to constitute instances of subclinical infection. Furthermore, it was of interest to determine whether individuals who escaped clinical infection possessed a characteristic level of serum antibodies. In order to secure information bearing upon these points, serum was obtained in one institution from a group of persons who had multiple exposures to the disease, frequently

FIGURE III

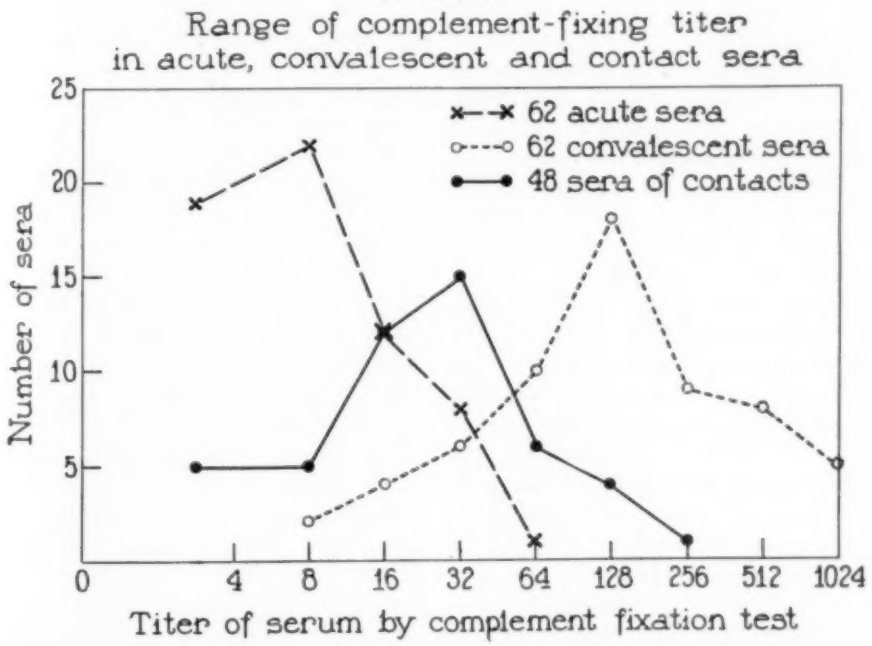
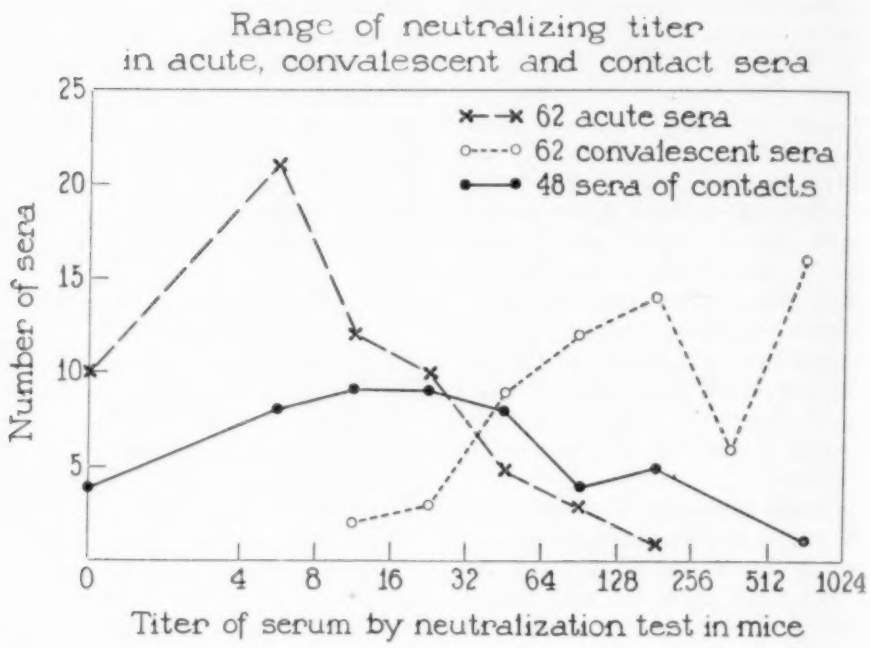


FIGURE IV



by close contact in the same wards, but who developed no clinical evidence of infection. At the time the first specimens of serum were taken from the contacts (January 21, 1937), the epidemic had been in progress for over a month, so that considerable opportunity for infection had occurred. In 5 of the 53 contacts (Nos. 6, 9, 30, 40, and 43), however, histories of illness during the current epidemic period required that these 5 patients be considered probable cases of influenza.

All sera were tested for neutralizing and complement-fixing antibodies to influenza virus. The average titers of the 48 sera were 58.5 by neutralization test and 38.5 by complement-fixation test. The results of the titrations were then compared with the acute and convalescent titers of sera from influenza patients. The comparison is presented graphically in Figures III and IV. The titers of acute and convalescent sera from the same 62 patients previously discussed, together with the serum titers of 48 contacts, are shown in the form of distribution curves.

With complement-fixation 41, or 66 per cent, of the acute sera have titers of 1:8 or less, while of the convalescent sera 40, or 64.4 per cent, have titers of 1:128 or more. The sera from the 48 contact cases, however, occupy an intermediate position since the titers of 33, or 69 per cent, of them ranged from 1:16 to 1:64. Only 10, or 21 per cent, of the contact sera fall in the zone of antibody titer in which two-thirds of the acute sera congregate, while 5, or 10.4 per cent, reach the height to which two-thirds of the convalescent sera attain. Thus the titers of the great majority of the contact sera lie in the range of the upper limit of the acute titers and the lower limits of the convalescent titers. The chance of probability that the titers of the sera from contacts belong in either the acute or conva-

lescent group is of the order of 0.000.000.1, which indicates that these results comprise a statistically distinct group rather than a mixed group of individuals in the acute and convalescent periods. In the latter case the distribution should be represented by a diphasic curve with its dip in the zone where the highest point actually occurred.

With the neutralization test the same tendency prevails although the differential is not so strikingly apparent. In fact, the distribution curve has more of a plateau which does, however, tend to occupy a mid-position. An analysis of the neutralizing antibody titers similar to that made of the complement-fixation results reveals that 31, or 50 per cent, of the acute sera and 12, or 25 per cent, of the contact sera have titers of 1:8 or less. In the upper range 36, or 58 per cent, of the convalescent and 6, or 12.5 per cent, of the contact sera have titers greater than 128. In the intermediate zone of titers between 8 and 128 fall 30, or 62.5 per cent, of the contact sera, an equal number (30, or 48.3 per cent) of the acute sera, and 26, or 42 per cent, of the convalescent sera. In any case the greatest frequency in the titers of the contact sera lies in the range beyond the greatest frequency of the acute titers and below that of the convalescent sera. The chance that the titers of the contact group represent individuals similar to those in the acute group is 0.003, and that they belong in the convalescent group is .000.000.01. These tests confirm the impression gained from the graphic representations.

The intrepretation of these results is not entirely obvious. While statistically the contact group represents a significant difference from the other two, it is apparent that since the titers lie in the intermediate position between acute and convalescent sera three explanations may be offered. The first is that these subjects represent individuals who have had higher antibody levels and are gradually reverting to a lower level. The second possible explanation is that the majority had suffered from sub-clinical infections resulting in comparatively low antibody titers. The third is that the majority of these patients had stabilized at this level and had actually escaped recent infection. The average titer of neutralizing antibodies in the group was 58.5 and of complement-fixing antibodies 38.5, not strikingly different from the patients of Group VI in whom no evidence of virus infection was obtained, but higher than the average acute serum. That the titers in the upper extremes, which comprise 10 cases (Nos. 2, 4, 12, 17, 20, 26, 31, 33, 34, 37), may represent recent infections cannot be denied. One of them (No. 17) most probably was, and in a similar manner those of the lowest titers might well under proper conditions become typical cases.

In an attempt to gain information for interpreting these points, serum from 39 of the contacts after an interval of 3 months was again obtained and tested, and histories were carefully analyzed. The results are shown in Table III. One patient (No. 27) had suffered from influenza beginning 4 days after the first bleeding, with a distinct rise in the antibody content of the second bleeding. In 3 other instances (Nos. 5, 21, 53) an increase in antibodies by both tests was noted. In 1 instance (No. 17) which had the highest titer of the group previously, a definite decline was observed by both procedures.

In 2 instances (Nos. 4 and 33) it is suggested that the patients were actually in the process of building up their antibodies at the time of the first bleeding since the complement-fixation value was high and a sharp

TABLE III

Serological Reactions in Normal Human Contacts

Contact No.	*Date of Bleeding*	*Titer of Neutralizing Antibodies*	*Titer of Complement-Fixing Antibodies*	*History Prior to First Bleeding*	*History Subsequent to First Bleeding*	*Comment*
1	1-21-37	4	8	Grippe Nov., 1936	Negative	
	4-22-37	6	8	Influenza 1918, 1933		
2	1-21-37	200	128	Negative	Negative	Probably sub-clinical infection
	4-22-37	200	64			
3	1-21-37	8	32	Grippe Nov., 1936 Influenza 1918, 1935		
4	1-21-37	30	128	Negative	Negative	"
	4-22-37	120	128			
5	1-21-37	6	8	Influenza 1917;	Negative	"
	4-22-37	30	32	none since		
6	1-21-37	240	64	Severe cold Dec.,	Negative	Considered to be clinical case; not contact
	4-22-37	160	64	1936		
7	1-21-37	30	32	Negative	Upper resp. inf. Mar. 1937	
	5- 7-37	100	16		Sore throat, temp. 104° 4 ds.	
8	1-21-37	60	64	Influenza 1931	Negative	
	5- 7-37	70	16			
9	1-21-37	50	64	Influenza few weeks	Negative	Considered to be clinical case; not contact
	5- 7-37	640	32	before; no fever		
10	1-21-37	35	16	Influenza 1927	Negative	No evidence of disease
	4-22-37	50	16			
11	1-21-37	50	16	Negative	Negative	"
	5- 7-37	70	16			
12	1-21-37	240	64	Negative	Negative to 3-1-37	Sub-clinical infection?
13	1-21-37	60	32	Negative	Negative	
	4-22-37	100	32			
14	1-21-37	6	8	Negative	Negative	
	4-22-37	4	0			
15	1-21-37	17.5	8	Negative	Negative	
	4-22-37	30	8			
16	1-21-37	25	64	Negative	Negative	
	4-22-37	30	32			
17	1-21-37	640	256	Influenza 1918	Negative	Certainly sub-clinical infection
	4-22-37	120	64			
18	1-21-37	8	0	Influenza 1918	Apr. 1, 1937, sore throat,	No evidence of influenza
	4-22-37	6	0		cough, no fever, 5 days	
19	1-21-37	30	16	Influenza 1918	Negative	
	4-22-37	30	0			
20	1-21-37	100	32	Influenza 1933	Negative	
	4-22-37	50	32			
21	1-21-37	27	16	Negative	Negative	Questionable antibody rise suggests infection
	4-22-37	60	32			
22	1-21-37	6	16	Negative	Negative	
	4-22-37	4	8			
23	1-21-37	8	32	Negative	Negative	
	4-22-37	15	32			
24	1-21-37	8	16	Negative	Negative	
25	1-21-37	0	32	Influenza 1919	Negative	
	4-22-37	0	16			
26	1-21-37	240	128	Negative	Negative	High antibody suggests sub-clinical infection
	4-22-37	200	64			
27	1-21-37	0	0	Negative	Influenza beginning	Typical case during course of observation
	4-22-37	30	32		1-25-37	
28	1-21-37	80	64	Negative	Negative	
	5- 6-37	50	8			
29	1-21-37	25	32	Negative	Negative	
	4-22-37	25	16			
30	1-21-37	70	128	1-12-37 upper resp.		Eliminated as contact, considered clinical case
	4-22-37	30	64	inf. temp. 103.6°		
31	1-21-37	140	16	Influenza 1919	Died 4-4-37	Cardiac death

TABLE III—(Continued)

Serological Reactions in Normal Human Contacts

Contact No.	Date of Bleeding	Titer of Neutralizing Antibodies	Titer of Complement-Fixing Antibodies	History Prior to First Bleeding	History Subsequent to First Bleeding	Comment
32	1-21-37	0	0	Influenza 1922		
	4-22-37	6	0			
33	1-21-37	60	128	Negative	Negative	Probably sub-clinical infection
	4-22-37	240	128			
34	1-21-37	100	64	Influenza 1923	Negative	Sub-clinical infection?
	4-22-37	60	16			
35	1-21-37	35	16	Influenza 1918	2-17-37 ill 2 days malaise	Probably not influenza
	5- 7-37	60	8			
36	1-21-37	6	16	12-12-36 2 days temp. 100° ?		Probably not influenza
37	1-21-37	240	64	Negative	Negative	High antibody suggests sub-clinical infection
	4-22-37	200	64			
38	1-21-37	17.5	32	Negative	Afebrile cold 3-10-37	
	4-22-37	30	32			
39	1-21-37	50	32	Negative		
40	1-21-37	60	64	Influenza 1918	Negative	Eliminated as contact; considered clinical case
	4-22-37	60	32	Influenza 1 day 1937		
41	1-21-37	60	32	Influenza 1932	Cold March, 1937	
	4-22-37	100	64			
42	1-21-37	8	16	Negative	Cold in March	
	4-22-37	6	8			
43	1-21-37	240	64	Influenza Jan. 1937	Negative	Eliminated as contact; considered clinical case
	4-22-37	120	16			
44	1-21-37	4	8	Influenza 1918		
45	1-21-37	12.5	16	Negative	Negative	
	4-22-37	17.5	8			
46	1-21-37	25	32	Negative	Cold in March, 1937	
	4-22-37	60	32			
47	1-21-37	60	32	Negative	Negative	
	4-22-37	120	32			
48	1-21-37	6	0	Negative	Cold April 1, 1937	
	4-22-37	15	8			
49	1-21-37	8	16	Negative		
50	1-21-37	0	32	Negative		
51	1-21-37	15	0	Negative	Cold in Jan. 1937	
	4-22-37	10	0			
52	1-21-37	6	16	Influenza 1918	Strep. throat 4-1-37	
	4-22-37	16	0			
53	1-21-37	15	32	Frequent colds; no definite influenza	Colds and bronchitis; no suggestion of influenza	Probable case of influenza
	4-22-37	120	64			
Average (eliminating 5 clinical cases):						
Total of 48 1st sera		58.5	38.5			
39 1st "		60.2	39.8			
39 2d "		63.7	28.9			

increase in neutralizing antibody titer was noted in the second test. In general, however, the titers were little altered from those of 3 months previous. The average titer of neutralizing antibodies in these 39 cases was 63.7 and the average complement-fixation titer was 28.9, in comparison with titers of 60.2 and 39.8, respectively, in their earlier tests. A number of minor changes in the range of a single dilution were observed, but 31 of the sera remained essentially unchanged in neutralizing titer, 15 in complement-fixation titer, and an additional 18 increased or decreased to the extent of

one dilution in complement-fixation titer. Furthermore, 9 instances of colds or other upper respiratory infection occurred in the month preceding the second bleeding but in no instance did these experiences cause significant deviation in the titer of antibodies to influenza virus.

The additional tests add little in the way of information except to show that perhaps 10 of these patients had undergone asymptomatic infection with the virus of epidemic influenza and that in 2 patients (Nos. 27 and 53) actual clinical infection ensued. In Contact No. 17 the high original titer and the sharp fall clearly indicate that this individual had been infected. The majority of the patients, however, appear not to have suffered from the disease despite the absence of high antibody titers. This field of inapparent infection and resistance will require much further study.

THE PERSISTENCE OF ANTIBODIES

In a previous report [1] was detailed the persistence of a comparatively high level of neutralizing antibodies in 3 patients for a period of 5 months after recovery. The serum of 1 of these subjects has been studied at intervals for a period of 2 years without showing an essential fall in titer. Nevertheless, little is known regarding the maintenance of antibody levels following infection. To study the rate of decline in antibody titer, serum was obtained from 32 of the patients who had previously shown increased antibody formation in early convalescence. Tests were made of the third serum samples, using the second sample of serum of the patients for comparative controls. In 11 instances the third bleeding was secured 2½ to 3 months after the original sample, the remainder 3½ to 5 months after the original.

It was found that after this interval a decline occurred in the average titers of neutralizing and complement-fixing antibodies to about half the level of early convalescence. The average titers of neutralizing antibodies in the first, second, and third samples were 21.2, 305.5, 162.3, respectively; of complement-fixing antibodies 11.5, 230.4, and 113.3, respectively. Little difference was observed in the extent of antibody decline between the sera tested at 2½ to 3 months and those of 3½ to 5 months.

With either test and at either time interval the average decrease was approximately 50 per cent. Twice, an increase of one dilution level was observed with complement-fixation, but none with the neutralization test. Otherwise a surprising parallelism exists within certain limits in the percentage decline by both methods. A decline in titer of neutralizing antibodies is usually associated with a parallel fall in complement-fixation titer. On the other hand, the complement-fixation titer may decrease without an accompanying change in neutralizing antibodies. Thus, in 17 instances no essential difference was observed in the titer of neutralizing antibodies of the early and late convalescent sera while all but 5 of the complement-fixation determinations showed decrease in titer. In 12 instances of the 27 in which complement-fixation titer decreased, it was only to the extent of one dilution level.

In the neutralization tests one other point stands out: Of the 11 patients whose neutralizing titers in early convalescence were 120 or below, only one showed a significant decrease in circulating antibodies in late convalescence. The relative decrease in the entire group was much more at the expense of those individuals who reached high antibody levels in early convalescence. This comparative stability of the lower titers seems to indicate

TABLE IV

Titer of Antibodies in Serum 2½ to 5 Months After Recovery

Case No.	Interval Between 1st and 3d Bleedings (Months)	Titer of Neutralizing Antibodies			Titer of Complement-fixing Antibodies		
		Acute	Early Convalescence	Late Convalescence	Acute	Early Convalescence	Late Convalescence
6	4	0	140	70	0	256	128
8	4	6	200	140	0	128	256
11	5	15	400	60	..	...	...
12	4	15	640	200	8	256	64
15	3½	17.6	640	160	0	128	32
16	3½	15	640	640	..	512	256
18	2½	6	640	140	0	128	32
19	2½	6	60	70	8	64	64
20	2½	0	30	25	0	256	256
21	2½	17	80	50	32	128	256
25	2½	6	640	280	0	1,024	512
26	3	15	640	200	64	512	128
27	3	8	140	50	8	512	128
28	4	30	200	240	64	128	64
29	2½	0	640	240	0	1,024	512
30	2½	12	280	100	32	512	256
33	3	40	120	120	0	8	0
34	2½	4	100	60	8	16	0
38	5	0	15	15	8	64	32
44	5	15	120	60	8	32	16
45	5	200	640	640	8	64	32
47	5	50	640	280	16	128	64
48	5	50	320	240	0	64	16
50	5	30	100	100	0	64	16
51	5	15	640	120	0	128	32
54	5	0	35	30	8	512	128
55	5	6	50	35	16	64	16
58	5	30	206	240	32	128	64
61	4½	15	100	100	0	16	16
62	4	6	240	120	8	128	64
63	4	30	240	320	8	128	64
79	4	20	200	50	8	32	8
Average		21.2	305.5	162.3	11.5	230.4	113.3

that the high titers represent an overproduction of antibody. The fact that many of the numerically lower titers in convalescent serum were from those individuals without antibody originally suggests that perhaps the possession of a certain amount of antibody before infection leads in general to higher titers in convalescence. The tendency of the neutralizing antibodies to decrease less rapidly than those of the complement-fixing type is of interest since the latter appear to reach their maximum titer earlier than the former, frequently before a significant increase in neutralizing antibodies is detectable.

The observations in this group of patients reveal that an average decrease of 50 per cent in the antibody titer occurs in 2 to 5 months, but this is more uniform in complement-fixing titer than in the neutralizing titer. Moreover, the decline in titer by neutralization test appears to be more common in individuals whose early convalescent sera reached the higher ranges while titers below 120 are more persistent.

DISCUSSION

The results of studies in the present series of 120 patients suffering from respiratory disease during the influenza epidemic of 1936–1937 serve to place the diagnosis of epidemic influenza on a firm basis. Thus, the diagnosis of epidemic influenza was made in 100 of 113 cases concerning which sufficient data were available for interpretation. Throat washings were obtained from 64 of the influenza patients, and in 52 (81 per cent) of them influenza virus was demonstrated. In 12 patients from whose throat washings virus was not recovered and in 36 additional patients from whom no throat washings were obtained, a diagnosis of influenza was made on the basis of serological reactions.

Serum was obtained early in the acute illness and in convalescence from 41 patients whose throat washings were found to contain the virus of epidemic influenza. Parallel titrations of the antibody content of the sera were made by the neutralization test in mice and by complement-fixation. It was found that the titer of the convalescent serum had increased, on the average, to a level 10 times as high as that of the acute serum. Consequently, a similar sequence of events in the serum of other patients even in the absence of virus recovery was considered diagnostic. On the other hand, in 11 patients whose throat washings failed to yield virus and in 2 from whom throat washings were not available, the absence of antibody response indicated that these patients had not suffered from epidemic influenza but from respiratory infections of different etiology.

In analyzing the results of the serological tests, it was interesting to note that when tested by either the neutralization or complement-fixation test the titers in the great majority of acute sera were less than 1:40 and the titers in the great majority of convalescent sera from the same patients were higher than 1:40. These observations suggested that a critical level between susceptibility and immunity occurred in that zone of antibody concentration. Hoyle and Fairbrother,[12] basing their opinion on differences in the antibody titers in the serum of the general population before and after an epidemic have concluded that such a level does exist. Moreover, Smorodintseff, *et al.*[13] reported that normal subjects with little or no circulating antibody were readily infected experimentally, while subjects with relatively high antibody titers were resistant. The sera of 48 individuals who had been freely exposed but who had not been ill were tested, therefore, to determine whether their resistance was reflected in any characteristic antibody titer. Interestingly enough, it was found that while a certain number of the results were in the usual range of the acute sera and others in the range of convalescent sera, the greater number of the contact sera congregated in a zone between the acute and convalescent sera and comprised a statistically distinct group. Subsequent study of sera obtained 3 months later from the same individuals suggested that perhaps 10 of them had undergone infection of sub-clinical severity while 2 had actually experienced clinical influenza. Furthermore, it is not unlikely that the higher titers originally observed in this group were a result of inapparent infection. Despite the fact that individuals with little or no circulating antibody escaped infection and that in certain clearly established cases a high titer of antibodies was present at the time of infection, the evidence that a rather distinctive antibody level obtained in the serum of non-infected contacts lends credence to the impression that within flexible limits the antibody titer may be related to the state of resistance.

How long the immunity developed

as a result of an attack of influenza persists is still unknown. In the present series of cases a surprisingly large number of patients, most of whom were adults, had no recollection of a similar illness and comparatively few gave histories of frequent, repeated attacks. Reference has already been made to an individual observed for a period of 2 years after a proved attack of epidemic influenza, who maintained a constant antibody level. From 32 of the patients whose sera were tested in the acute and early convalescent phases of the disease, serum was again obtained and tested 2½ to 5 months later. The average titer by both complement-fixation and neutralization tests had declined about 50 per cent below the level attained in early convalescence. This decline was most regular in the complement-fixation results but in both tests the most marked, and usually parallel, drop was observed in the sera of those individuals whose sera reached the highest titers originally. On the other hand, little change was noted in the titer of neutralizing antibodies among individuals whose titers had not exceeded 1:100 in early convalescence. It appears that these moderate titers are maintained more consistently than the extremely high titers which probably represent immunological over-production. Final opinion regarding the duration of immunity and the persistence of antibodies awaits, however, a much longer period of observation and study.

SUMMARY

A final diagnosis of epidemic influenza was made in 100 patients suffering from respiratory disease during the epidemic period of December, 1936, to March, 1937. From 64 of these patients throat washings were obtained, and in 52 instances the throat washings were shown to contain the virus of epidemic influenza.

In 48 patients the diagnosis of epidemic influenza was made on the basis of the neutralization test in mice and the complement-fixation reaction. Using the same procedures, it was also possible to demonstrate that certain cases of respiratory disease occurring at the same time as the epidemic were of non-influenzal origin. It was also shown that in patients with prolonged illnesses or relapses the continuation of disease was most probably due to intercurrent infection since the patients when first seen were already convalescent, serologically, from influenza and virus was not recovered from the respiratory tract.

During convalescence the antibody concentration of the serum rises to approximately 10 times the height of that observed in the serum early in the disease. The antibody titers of a group of contacts who experienced no clinical evidence of infection occupy a position midway between the usual acute and convalescent zones.

Extremely mild or sub-clinical infections which may play a definite rôle in dissemination of the disease and in immunity are shown to occur.

The duration of immunity and the relation of antibodies to immunity are briefly discussed.

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REFERENCES

1. Francis, T., Jr., and Magill, T. P. *J. Exper. Med.*, 62:505, 1935.
2. Smorodintseff, A. A., Drobyshevskaya, A. I., and Shishkina, O. I. *Lancet*, 2:1383, 1936.

3. Francis, T., Jr. *A.J.P.H.*, 27:211, 1937.
4. Francis, T., Jr., Magill, T. P., Beck, M.D., and Rickard, E. R. *J.A.M.A.*, 109:566, 1937.
5. Francis, T., Jr., and Magill, T. P. *Proc. Soc. Exper. Biol. & Med.*, 36:132, 1937.
6. Francis, T., Jr., and Magill, T. P. *Ibid.*, 36:134, 1937.
7. Francis, T., Jr. *Science*, 80:457, 1934.
8. Muench, H. Unpublished data.
9. Andrewes, C. H., Laidlaw, P. P., and Smith, W. *Brit. J. Exper. Path.*, 16:566, 1935.
10. Fairbrother, R. W., and Hoyle, L. *J. Path. & Bact.*, 44:213, 1937.
11. Turner, T. B. In press.
12. Hoyle, L., and Fairbrother, R. W. *Brit. Med. J.*, 1:655, 1937.
13. Smorodintseff, A. A., Tushinsky, M.D., Drobyshevskaya, A. I., Korovin, A. A., and Osetroff, A. I. *Am. J. Med. Sci.*, 194:159, 1937.

Two other papers from the Symposium on Virus Diseases will be published later: Experiments on Antirabic Vaccination with Tissue Culture Virus, by Leslie T. Webster, M.D., and Lymphocytic Choriomeningitis, by Thomas M. Rivers, M.D., Sc.D., and Robert D. Baird, M.D.

On the Nature of Virus Agents*

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THERE is little that discussion can add to the foregoing papers. They are reports of clinical and experimental observations made by a group of the foremost investigators engaged in these problems and represent notable additions to the knowledge of their respective subjects. Comment on such work without correlated experimentation is time wasted. In listening to this symposium, however, one is impressed with the progress in method and scope which has taken place in virus study during the short space of 10 years. Not only has the field expanded until it is as broad, in its clinical and public health importance, as bacteriology and protozoölogy—but there has been a development of technic by which clinical observation, cultural study, animal experiment and pathology have begun to acquire much of the precision and flexibility of that used in the older fields.

We have begun to emerge from the purely speculative phases of this subject and have arrived at a point at which enough facts have accumulated to permit experimentation to take off from a few solid premises. We are through, among other things, with the elaborate regimentation of questionable evidence strained to interpret virus agents as phases in the life cycles of well known bacteria. Also the temptation to give addresses on "Are Virus Agents Dead or Alive?" is growing more feeble as we recognize that this question is not only futile but leads to utterly sterile metaphysical efforts to define life.

In segregating the so-called virus agents from known infectious microorganisms such as bacteria many features have been stressed, notably those of size and filterability, inclusion bodies, extreme specificity, flexibility of tissue specificity and immunological phenomena. As far as the last named are concerned much of the immunological difference between virus infection and bacterial invasions may be eventually explained by the intracellular position of the former. And since we know that virus agents are definitely antigenic and many serological phenomena, such as precipitation and agglutination, have been performed with virus systems, it may well be that eventually the immunological peculiarities may prove to be dependent upon such secondary attributes as size, surface exposures, etc. Even the apparent

* This paper was presented as a Discussion of the foregoing papers.

instability of the virus-antibody union, subject to dissociation by dilution, has been imitated under suitable conditions with bacteria and their antibodies. Much could be said about these problems. But in the present discussion I wish to limit myself to the selection of a few simple facts on the basis of which virus agents can be, if not classified, at least fundamentally described.

Of these the most important are those made in studies on cultivation. It is fair to say that, to date, no one has succeeded in obtaining cultural multiplication of a virus except in the presence of living or viable cells. Thus, stating it conservatively, the multiplication of a virus seems to require either some delicate nutritive constituent of cells or the actual participation of metabolic cell activity. Which is it?

Our own experiences with Schoenbach [1] appear to indicate that the curve of virus growth is roughly proportionate to the active metabolism of the cells in Maitland cultures; and that shortly after the stabilization of the potential in the liquid of such cultures and the practical cessation of oxygen consumption, the virus not only stops multiplying but deteriorates rapidly—that is, diminishes in quantitatively determinable activity—and this even though there may be viable though inactive cells present.

On the work done by Dr. Schoenbach and myself an obvious criticism is that we seem to be drawing conclusions of a fundamental nature from titration curves carried out with a single virus. The important fact, of course, is the parallelism between the quantitative rise and fall of virus and the metabolic activity of the cells. If the maximum virus concentration lags somewhat behind the point of metabolic stabilization, this is quite natural, owing to the fact that the virus titrated is in the fluid of the cultures, and experiments such as those of Haagen [2] with yellow fever virus have demonstrated the expected fact that virus lasts longer in the cells than in the fluid. Eventual discharge of virus from the cells would then account for the lag. We would have carried out daily quantitative virus titrations with other varieties of these agents if this had not been done for us by a number of other investigators. Thus, Webster and Clow,[3] though they give no curves, did all their titrations and transfers of their cultivated rabies virus on the 4th day. Magill and Francis,[4] in cultivating human influenza virus in Maitland cultures with chick tissue and Tyrode solution, found the highest concentration of virus between 36 and 48 hours, with a definite decrease beginning on the 72nd hour; and Haagen,[5] again with yellow fever virus, cultivated in Maitland cultures with normal monkey serum, Tyrode and chick embryo, constructed tables which showed definite drops of titer in the fluid of his culture before the 72nd hour, and similar drops of the virus in the cells on the 4th day. Titration curves exactly similar to our own with the equine encephalitis virus have been determined for vaccinia virus cultures by Rivers.[6] *

It is thus evident that in a great many cultures of virus agents the growth curve resembles our own.

It would appear then that virus multiplication requires the coöperation of cell metabolism. This is in contrast with Rickettsiae multiplication on similar media since the latter seem to grow best after metabolic stabilization has taken place but before autolytic or other chemical change of the supporting cells has begun. This contrast is mentioned only because it seems to mark

* It is pertinent to this point also that Rivers and his associates found that tissue frozen and thawed no longer support the growth of Vaccinia virus. Rivers, T. M., Haagen, E., and Muckenfuss, R. S. *J. Exper. Med.*, 50:181, 1929.

the fundamental dividing line between virus agents and one of the most parasitic of recognized microörganisms. Both are obligatorily intracellular—yet one, the Rickettsiae, seems to require some environment which only the cell furnishes without dependence on active metabolism.

Let us take then as our first fundamental characteristic the dependence of virus agents upon the metabolic activity of the cells in which they multiply. And this characteristic seems to be entirely consistent with the recent discovery of Stanley. However cautiously one may approach the work of Stanley [7] on tobacco mosaic one can no longer question the fact that he has obtained a crystalline protein which one must accept as practically pure virus and for which molecular weight determinations range from over 1,000,000 to as high as possibly 10,000,000 or more while the normal proteins of healthy tobacco plants contains no proteins of molecular weight above 30,000. Northrop's bacteriophage protein, though not crystallized and possibly not entirely pure, has a diffusion rate equal to that of the active agent—is absorbed by susceptible bacteria to the same extent as the phage principle and is not absorbed by resistant bacteria. And for this active protein Northrop [8] postulates a molecular weight of about 500,000.

We have no comparably reliable data concerning any of the virus agents of mammalian disease. But that some of them are chemically similar to the mosaic virus and bacteriophage is apparent. A good many years ago Clark [9] carried out partial purification of poliomyelitis virus by ammonium sulphate precipitation. And recently we have repeated and extended this work by methods analogous to those used by Stanley—though rendered more difficult because this virus can be obtained only in the form of monkey brains. But even as far as this work has gone, the monkey injections, carried out for us by Dr. Aycock, have shown that the active agent can be precipitated out of alkaline brain extracts by 35–40 per cent ammonium sulphate, followed by dialysis, re-solution and re-precipitation with acid at about pH 4. Again, the active virus was obtained by ammonium sulphate treatment followed by alum precipitation, re-solution with sodium citrate and dialysis.

Such incomplete observations have only discussion value. But they at least indicate analogy in resistance and behavior of some of the mammalian agents to those studied by Stanley.

At any rate, from the facts ascertained we have reason to believe—if not as yet to know with certainty—that some virus agents behave like proteins of large molecular size. Combining this with what we have learned about the dependence of their multiplication upon metabolic cell activity, Stanley's conception gains significance. Stanley has postulated what is known as "autocatalysis," by which he suggests that the plant protein is "polymerized," or "directly synthetized" to the molecularly higher virus protein; and when such a larger molecule has once been either formed or inoculated in living tissue it functions as a catalyst for its own reproduction.

If, on conventional grounds, it is not easy to conceive that mere polymerization of cell proteins should render it antigenically heterologous, we should remember that the assumption is not without experimental analogy. That purely physical modifications can bring about specific antigen alteration has been suggested in work with "heat" precipitins and in that of Marcheboeuf and Basset [10] who found that horse serum subjected to high pressures becomes antigenically modified.

In this connection much is to be learned from Northrop's enzyme

studies. Northrop[11] has shown that inactive derivatives of enzyme proteins —acetyl-pepsin and heat inactivated trypsin among others, can be converted into the active form by relatively simple chemical alterations. In other words some enzymes can form themselves from inert proteins and, in such change, at least in some cases, there is no splitting of the molecule but merely some internal rearrangement.

The analogy with Stanley's suggestion is obvious and, if one favors such a view, the "inoculation" with a virus would represent merely the supplying of the initial unit of one of the products of the reaction which is essential for autocatalysis. In connection with such speculation we may call attention, in passing, to our own work, with Seastone,[12] since confirmed by Perdreau,[13] on the partial reactivation of herpes virus deteriorated by exposure to air by reduction with cysteine.

The field of virus research has presented so many extraordinary phenomena not readily approached by conventional methods that it has, quite naturally, stimulated much speculation. I do not intend to swell the speculative literature by still another theory. But I believe that in order to formulate experimental approach we should endeavor to incorporate our views of the virus diseases into an orderly system in relation to the so-called infectious diseases in general.

If we emancipate ourselves, for the moment, from the conception that infectious disease—or let us say parasitism, is always a state in which a purely extraneous unit multiplies by independent metabolic processes at the expense of the host—we can arrive at a gradation of the conception of "infectious agents" somewhat as follows:

At one end of the scale there are metabolically independent units such as bacteria—which can thrive and multiply both in the body and on artificial media. More strictly parasitic than these are invaders which depend for multiplication and metabolism more and more closely upon the specific environmental conditions in the animal body. Still more severely dependent are the next class—like the Rickettsiae which appear to require intracellular conditions but still appear to be capable of multiplication by their own metabolic processes. It is only a step from these to the virus agents which multiply intracellularly and cause pathological injury but appear to depend for increase and survival upon the coöperation of the metabolism of the invaded cells. If this premise proves to be precise—some conception related to that of Stanley is inevitable—and here lies the physiological differentiation of virus agents from known microörganisms. Analogy to the formation of enzymes is obvious.

These considerations are not set down as a theory. They are outlined because it seems wise from time to time to reorganize our views for purposes of guiding experimental attack. Moreover they arouse the hope that virus investigation may eventually contribute important conceptions to fundamental problems of evolution.

REFERENCES

1. Zinsser, H., and Schoenbach, E. *J. Exper. Med.*, 66:207, 1937.
2. Haagen, E. *Centralbl. f. Bakt.*, 128:13, 1933.
3. Webster, L. T. and Clow, A. D. *J. Exper. Med.*, 66:125, 1937.
4. Magill, T. P., and Francis, T., Jr. *J. Exper. Med.*, 63:803, 1936.
5. Haagen, E. *Loc. cit.*
6. Rivers, T. M. Personal communication.
7. Stanley, W. M. *J. Biol. Chem.*, 115:673, 1936, and *ibid.*, 117:325, 1937.
8. Northrop, J. H. *Science*, 84:90, 1937.
9. Clark, P. F., Schindler, J., and Roberts, D. J. *J. Bact.*, 20:213, 1930.
10. Basset, J., Marcheboeuf, M., and Wollman, E. *Ann. de l'Inst. Pasteur*, 58:58, 1937.
11. Northrop, J. H., *Physiol. Rev.*, 17:144, 1937.
12. Zinsser, H., and Seastone, V. *J. Immunol.*, 18:1, 1930.
13. Perdreau, J. R. *Proc. Roy. Soc. Med.*, 109: 304, 1931.

Prevention of Poliomyelitis

THE following suggestions are the result of a meeting of the Advisory Committee to the Department of Public Health on acute anterior poliomyelitis at the San Francisco Hospital on September 8, 1937 (J. C. Geiger, M.D., Director of Public Health, City and County of San Francisco):

The recent widespread publicity given to the use of zinc sulphate spray in recent outbreaks of poliomyelitis (infantile paralysis) throughout the country has caused considerable interest locally among parents, who, looking forward to a possible increased incidence of the disease on the Pacific Coast, naturally desire to avail themselves of any aid in preventing it. Dr. Schultz, of Stanford University, by extensive experimental work, has demonstrated that 1 per cent solution of zinc sulphate, 1 per cent pontocaine, and ½ per cent sodium chloride in distilled water is the best chemical spray, experimentally on monkeys.

There is definite evidence that such preparations, when properly applied, will afford a remarkable degree of protection to *monkeys*. Whether this will follow in the case of the human being has yet to be determined. The use of this method must be strictly limited until the proper technic has been worked out, as the method of application is definitely unsettled at present.

Attention is called to the possible side action of the local anesthetic, and the physician giving the treatment should be on the lookout for symptoms of poisoning. Attention is further called to the hazards of using a long-tipped atomizer in the vicinity of the cribriform plate. This method also is impracticable in the cases of small children, for whom the instillation of the solution in the Proetz position is advocated. It is particularly pointed out that any attempts at home medication are absolutely valueless.

It may be deemed advisable to make a preliminary application of a substance such as ephedrin to shrink the mucous membranes before applying the zinc solution. The local anesthetic and the shrinking agent could be used together. The injections should be given once every 2 or 3 weeks, as determined by a returning sense of smell. No change in the constituents of the solution should be made without investigation as to the experimental result on monkeys.

It is recommended that the use of this solution be optional with the family of actual contacts to the disease. The treatments shall be conducted in centers to be determined at a future date. These centers will be under adequate supervision, and any physician who wishes to learn the technic can attend and be instructed by a proficient specialist. A record of all treatments given in these centers shall be kept and, in addition, there shall be a follow-up of the patients receiving the treatment. Zinc sulphate spray, if used at all, must be under the direction of a competent physician, with the understanding that it is used on an experimental basis only.

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OUR SIXTY-SIXTH ANNUAL MEETING

THE Sixty-sixth Annual Meeting of the American Public Health Association will go down in history as one of the most important and most successful that have ever been held by this Association. Never have we had such a large attendance, never has there been such acute interest, and never have the individual sessions been better attended. The wealth of material presented has been puzzling and one is forced to wish that he had a multiple personality so that he could attend at least a half dozen sessions at the same time.

It is impossible to consider the meeting proper without some mention of the various interesting functions and happenings which have been offered to the entire membership or to special groups of our members. The week before the formal opening we had The Health Education Institute, which for a number of years has been sponsored by our Association. This year it excited a great deal of interest and was largely attended—we believe the largest attendance on record. A special report will be made of this later.

On the day before the formal opening of these sessions a considerable number of members were invited to the opening of the Central Harlem Health Center. This is the sixth of the thirty health centers of New York City to be put in operation by 1945, opened under the administration of Mayor LaGuardia and under the supervision of Dr. John L. Rice, Health Commissioner of the city. The special importance of this center lies in the enormous increase of Negroes occupying that part of the city, estimated now at approximately 250,000—almost a special racial problem.

The first general session was held on Tuesday with Dr. Thomas Parran, President, presiding. We had a very unusual experience in having no absentees from the list of speakers. Governor Lehman of New York gave a masterly address on public health which struck a responsive chord, and he once again gave evidence of that great interest in public health he has shown during his

entire administration. He was followed by Mayor LaGuardia, who like Governor Lehman has shown an unusual interest in the welfare of the public. The formal address of the evening was given by Dr. Livingston Farrand, recently retired President of Cornell University, whose interest in public health has long been known.

Another most important dinner meeting was held on Wednesday evening by the National Society for the Prevention of Blindness at which many of the members of the Association were present. Forty-one states of the Union and the District of Columbia were represented at the tables. The meeting was designed for executive health officers but in addition to these there was a large attendance of those interested in public health in general.

An interesting feature was the luncheon given in recognition of the fifteenth anniversary of the Health Education Section of our Association, designed in honor of Mr. Evart G. Routzahn, who has always been active in our service along these lines.

It may seem invidious to pick out any special sessions for mention above others. There have been a number of special sessions of more than usual interest. We hope we may be pardoned for selecting for special mention the one held on Wednesday afternoon entitled "Public Health Advances," at which was given an admirable address on the beginning of the public health movement in this country, followed by other papers tracing our advancement along several special lines. The last paper in this program discussed a projected feature for the World's Fair to be held in 1939, namely the Medical and Public Health Exhibit and the Museum of Hygiene. Germany has at present in Dresden a wonderful Museum of Hygiene which has been visited by many of our members, and some of the exhibits have already been brought to this country. It is intended not only to reproduce for the World's Fair much of this exhibit but to add to it so as to bring to the twenty million people who are expected to visit the Fair ocular demonstration not only of the form and functions of the human body but its needs for attaining its highest development.

The Scientific Exhibits of the Association at this meeting have been the most extensive and the best ever presented. It is impossible here to describe them or even to give a fair idea of them—more's the pity. They have been widely visited by thousands and we cannot but believe that an enormous amount of information has been given by them. Too much praise cannot be extended to those responsible for this feature of our meeting.

The Commercial Exhibits have been extensive and excellent.

The Annual Banquet on Thursday night, attended by more than 750, ended the general sessions. The President-Elect Dr. Arthur T. McCormack, Health Officer of the State of Kentucky, was inducted into office, succeeding Surgeon General Thomas Parran as President of the Association, and gave his annual address. All are familiar with his facile way of presenting topics, to which this was not an exception.

The entertainment provided for the members of the Association has been plentiful and varied. The visiting ladies were provided for by a special committee, and there were trips to many points of general interest. In addition there were others for specialists in the various lines of public health—slum areas, historical houses, to laboratories of various sorts, public health and otherwise, to filter plants, to water supplies, sewage plants, and various health centers. One of special interest was that to the marvelous Holland Tunnel and its ventilating

system, which was designed after very careful study by engineers and physiologists and which has been most successful. We wish it were possible to go into more detail but lack of space prevents.

We were fortunate in entertaining a distinguished group of foreign visitors representing the League of Nations, England, Canada, Mexico, Puerto Rico, Cuba, Germany, and Guatemala.

To the officers of the State of New York, both lay and medical, who have taken an active interest in the meeting in this the greatest city of the United States, as well as to the officers of this great city and to the citizens in general, we offer our profound thanks for the entertainment which has not been exceeded even at meetings in our Southern land which is widely known for its hospitality and geniality.

ABEL WOLMAN

ABEL WOLMAN, our President-Elect, was born in June, 1892, in Baltimore, Md. His preliminary education was received at the Baltimore City College. He was graduated from Johns Hopkins University as Bachelor of Arts in 1913, and from the same University as Bachelor of Science in Engineering in 1915. In 1937, he was given the Honorary Degree of Doctor of Engineering and made Professor of Sanitary Engineering in the School of Engineering and School of Hygiene and Public Health of his Alma Mater.

Abel Wolman, Dr.Eng.

He has had a wide experience in sanitary engineering, both from the practical and theoretical sides. Since 1922, he has been Chief Engineer of the Maryland State Department of Health, and for 7 years prior to that, held a number of positions in the same department, making special investigations of many sorts. As a result of his studies and investigations, he has written a number of outstanding articles which are quoted far and wide in the profession. His activities have not been confined to his native state, but he has repeatedly been called upon by the national government and has done a great deal of work for it in connection with the Federal Emergency Administration of Public Works. He has also been called upon by states and cities quite far from his home. He has been Lecturer in Sanitary Engineering at Harvard University, Princeton University, the University of Southern California, the University of Chicago, and other institutions of learning. From 1921 to 1937 he was Editor-in-Chief of the *Journal of the American Water Works Association;* from 1923 to 1927 Associate Editor of the *American Journal of Public Health;* in 1924 Editor of *Manual of Water Works Practice;* and from 1929 to 1936 was Editor-in-Chief of *Municipal Sanitation.*

His membership in learned societies, chiefly those connected with his profession, is extensive, including practically all that anyone in his profession should belong to.

It is impossible to speak too highly of his services to this Association. He has served as Chairman of the Public Health Engineering Section and Chairman of the Committee on Research and Standards. He became a member of the Association in 1916 and a Fellow in 1922. In the American Water Works Association, which is closely allied with the American Public Health Association, at least as far as establishment of standards goes, he has served on practically every important committee, and as chairman of most of them. Indeed one wonders how he has done so much and done it so well, as some of the committees on which he has served do not seem very closely allied to the field of the sanitary engineer; for example, he is a member of the Revision Committee of the United State Pharmacopoeia. He has also been very much interested in the training of engineers, and has been Chairman of the Committee on Public Education of the American Society of Civil Engineers.

We wish that space permitted us to give a list of his many positions of honor and usefulness, as well as his accomplishments. We are fortunate in having a man who is so well qualified and stands so high with his professional brethren in his different lines of work as our President-Elect.

SIR ROBERT W. PHILIP—WORLD BENEFACTOR

THIS year is a semi-centennial of great social importance. Just fifty years ago, an unknown young physician, Robert W. Philip, organized in Edinburgh, Scotland, the Victoria Dispensary for Consumption, the first clinic for the diagnosis, treatment, and control of tuberculosis. The occasion is now universally recognized as one of the most important events in the history of the public health movement. The world owes a great debt to Dr. Philip, the extent of which is even today not fully realized.

Robert Koch, by isolating the tubercle bacillus had recently proved that the disease was infectious; but practically nothing was known of the means by which this dreaded affliction could be controlled.

Dr. Philip observed that in the vast majority of cases the presence of tuberculosis was not physically recognizable in its early stages and, consequently, that most cases which came to the attention of the physician were so far advanced as to be beyond medical assistance. He grasped the fact that these cases were centers for the spread of the disease, particularly among the children and other members of the household. He realized that if the disease was ever to be eliminated, it must be attacked at its source, namely, in the homes; that cases must be sought out in their incipiency and cured before they became centers of further infection; that it was not sufficient to wait until cases voluntarily presented themselves for treatment.

Dr. Philip foresaw that it was necessary to establish a communal center to fulfil the double function of searching for and dealing with cases of tuberculous infection. This center, as outlined in his mind, was to serve (1) as a receiving place for medical diagnosis, (2) as a clearing-house for observation and the methodical examination of contacts, (3) as a center for the investigation of environmental conditions and for the general care of tuberculous households, and (4) as an information bureau and source of propaganda. In a word, the clinic

was to be a center linking the various efforts against the disease in the community.

The principles thus laid down, although based upon hardly a vestige of past experience or precedent, have served without essential change as the basis of all effective tuberculosis work since that day.

In 1887, when Dr. Philip first opened his dispensary, tuberculosis was the chief cause of death throughout the western civilized world. In both Great Britain and America the death rate from this disease was then above 250 per 100,000 population. No one has any conception of the enormous economic losses and the widespread misery which this scourge then occasioned. Today, the mortality from tuberculosis in Great Britain has been reduced to 28 per cent and in America to 22 per cent of that prevailing when Dr. Philip first pointed the way toward its elimination. Needless to say, the amount of heart-break and misery has been correspondingly reduced. The economic saving in the field of industry alone has been incalculable.

Philip stands in the front rank of the world's great benefactors. Let us honor him while he is still alive that he may sense our grateful appreciation of a long life spent in the interest of his fellow man.

LETTER FROM GREAT BRITAIN

ENGLAND'S "GOOD YEAR FOR HEALTH"

In presenting "to the King's Most Excellent Majesty" the report of the Ministry of Health for the year ended 31st March, 1937, the Minister (Sir Kingsley Wood) claims that year to have been a "good one for health." There is much in the report to support that claim and to show that a volume of most useful work was done on behalf of the public health, and considerable progress made in a number of directions.

One of the greatest contributions of recent years to better health has been the reconditioning or destruction of vast numbers of unfit houses. In the matter of housing, 1936–1937, the fourth in the 5 year programme of slum clearance, has shown extraordinary activity in this direction. In connection also with the provision of houses to replace slums or to let at low rentals, a record was set up. The actual figures were 71,734 for the former, and 346,047 for the latter. The total capital expenditure on housing since 1919 amounts to £722,500,000, a sum which has been used in helping to erect some 3,000,000 new and decent houses, and to provide improved housing conditions for about one-third of the entire population of England and Wales. Immense as the sum is, it is a part only of the expenditure capable of being regarded as devoted to health; just as housing improvements are part only of the activities that have gone to make the year a "good one for health."

Actually, on public health the net expenditure of local authorities in England in 1934–1935 was over 44 million pounds sterling, and this did not include the amounts spent on housing and other provisions such as water supply, and so on. On housing in 1934–1935 the net expenditure was nearly 17 million pounds.

AN IMPROVED MIDWIFERY SERVICE

General improvement in working conditions, a rising standard of living, more temperate habits of the people themselves, improved water supply and hygienic conditions generally, have all helped to make for better health, but to improved housing great credit must go. Other works calling for recognition as making for progress, and that in fact receive it, include, prominently, those done in relation to maternity and child welfare, disease prevention, to national health insurance, and so on. As indicating their importance, it is the medical welfare services, and particularly works done in relation to maternity and child welfare, that first come under review in the report. Here particular attention is devoted to the midwifery services and the effects likely to follow the operation of the Midwives Act, 1936. This provides for the setting up of a salaried service of midwives throughout the country by the local authorities alone or in conjunction with voluntary associations.

As showing the friendly relations existing between the two sets of bodies, it may be noted that out of the large number of the latter, only a handful were unable to make arrangements for coöperation without reference to the Ministry of Health as a central court of appeal. Actually, what has happened is that in the large majority of county areas, county councils have en-

tered into arrangements with nursing associations, while the authorities of more populous areas for the most part have preferred to employ their own midwives. In any case, the result will be that throughout the country skilled attention will be readily available for women in childbirth.

From all appearances, also, there should be no lack of attention in the antenatal period either, since at the end of 1936 the 371 authorities operating schemes in the country had established 1,568 antenatal clinics. These same bodies had provided no fewer than 3,000 infant welfare centres and appointed 5,280 health visitors. Other welfare activities of the local authorities affect the blind, the deaf and dumb, the mentally deficient and the lunatic, and, according to the report, are having most beneficial results.

SOLVING THE TUBERCULOSIS PROBLEM

Work in relation to disease prevention naturally affected very largely those grouped as communicable. Smallpox remains very much at bay in spite of the fact that the fall in the number of vaccinations and the rise in the number of "conscientious objectors" continue. In all only 12 cases of this disease were notified in 1936. Diphtheria was less prevalent than in the 2 previous years, while an increase in the amount of typhoid fever was entirely the result of an outbreak in a holiday resort, traceable to a contaminated milk supply, the causative agent being a carrier. That the belief of authorities in isolation hospitals persists is evidenced by the fact that the Ministry of Health was called upon to grant approval to a number during the year. Further evidence is available, however, to show that the present policy involves the replacing of small units by larger institutions.

That the efforts made to deal with tuberculosis are proving successful is revealed in the figures relating both to deaths and notifications. The death figures are the lowest ever recorded for pulmonary and non-pulmonary forms, while the cases notified numbered considerably less than in the previous year. Great satisfaction is expressed with the progress made in connection with the tuberculosis schemes of local authorities, which include the provision of sanatorium and hospital beds, the number under schemes now being 29,777. The work done in village settlements and in connection with boarded out children receives great praise.

CANCER AND VENEREAL DISEASE

The fact that, though there are proposals to increase the number of treatment centres (176) provided by local authorities, the total attendance continues to fall, is noted as most interesting. A comparison of 1920 with 1936 shows that there was a reduction of 56 per cent in the number of cases of syphilis, and of 28 per cent in the total number of cases of venereal disease. The 1,802 new cases of congenital syphilis may be compared with the 1,909 for 1936. Cancer, unfortunately, appears in a less favourable light than the venereal diseases, and in the situation regarding it there is less reason for congratulation, since, though advances continue in regard to treatment, these assist not at all so far as the securing of control and prevention is concerned. In the case of the venereal diseases, syphilis particularly, treatment and cure have played an outstanding part in these directions. The problem there, however, is different entirely in its nature from that surrounding cancer, which must await solution until research into causation places something more at the disposal of preventive medicine than at present is available. The situation is that "in

spite of continued and, indeed, intensified medical research, and of undoubted advances in knowledge, the method of causation remains obscure."

THE HEALTH INSURANCE SCHEME

In the section dealing with National Health Insurance, figures of extreme interest are shown. The number of persons insured showed a marked increase, as did also the amount of contributions. In both cases this was a direct result of continued improvement in economic conditions. The number of insured persons which had been 15,772,000 at the end of 1935, reached at the end of 1936, 16,215,000. The increase in contributions was by 4.8 per cent, from £23,141,000 to £24,264,000. The fact that the revenue of 1936 exceeds that of 1932 by approximately £3,000,000, representing 80,000,000 working weeks, is a striking illustration of the industrial progress of the last few years. Amongst statements made with regard to the extent and cost of medical benefit, the following are worth quoting. In 1936 about 15,403,000 insured persons were entitled to medical benefit. They were attended by about 16,000 physicians, and they obtained their medicines and appliances from about 12,000 drug stores. The total expenditure on medical benefit was £9,430,000, of which insurance physicians received over £6,868,900 for attending and treating insured persons, and insurance chemists received £2,084,600 for drugs, etc. The amount expended on grants to enable physicians in rural districts to attend short courses of postgraduate study was £2,450. With the extensions that are to be made in the direction of providing opportunities for such study to panel practitioners, considerably larger sums will, of course, be expended. I have been able only to mention a few of the points in this and other parts of the report which the Minister of Health regards as indicating that the year 1936 was a "good one for health."

A NATIONAL HEALTH CAMPAIGN

That there are possibilities of making its successors even better ones, he appears to be convinced, and with this object in view he made considerable alterations in the design of the report for 1936, transforming it from the more or less dry record that such publications are liable to be, into a volume readable by the man in the street, and an addition to the collection of health education and propaganda material. Having regard to the fact that there was an intention on the part of the Minister and the Ministry to conduct a nation-wide campaign of health propaganda in the six months almost immediately after its appearance, it was useful that the report should be used as one of the publications first to direct attention to the matter. Even more useful was the message which the Minister of Health jointly with the Education Minister, addressed to local authorities on the subject; and most useful, impressive, and effective the address that the Prime Minister himself (Mr. Neville Chamberlain), speaking at a great gathering at the London School of Hygiene, broadcast on the eve of the opening of the campaign on 30th September.

CHARLES PORTER, M.D.

PUBLIC HEALTH EDUCATION*

Thank You!—The return of the A.P.H.A. Annual Meeting to New York marked the completion of the first cycle in the history of the Public Health Education Section which was organized in that city in 1921. This 15th anniversary was marked by a luncheon session in which the editor of this department shared the honors.

The editor thanks those who were kind enough to attend that luncheon and those who have otherwise expressed interest in the 15 year record. And the editor assures every reader that he has had a ggggrand time in doing things with the Section and the *Journal* and in the association with members of the Section and others in the A.P.H.A.

Health Education, October 5–8, 1937—To complete the record that all may read it, here are the health education features and topics found in the final program of the 1937 annual meeting of the American Public Health Association:

The Technical Exhibits, the booths of the commercial concerns, offered a certain amount of data as background information for the health educator, as well as some printed matter usable on occasion.

The Scientific Exhibits, which will be reported elsewhere, presented both popular and professional educational material.

The A.P.H.A. Book Exhibit made available for examination more than 500 books of health interest

Health Education and Publicity Headquarters will be reported elsewhere.

A Motion Picture Program presented professional and popular pictures at hourly intervals.

Press Headquarters, too, served health education by making it possible for newspapers and other periodicals to spread widely many high points in the convention program.

The program of sessions included the following:

Child Hygiene Section: "Evaluating Dental Health Education and Dental Service Programs."

Public Health Association of New York City: an illuminating pageant of public health progress.

Public Health Advancing (a special session) included: "Health Education for Millions" (about hygiene museums).

Health Officers Section (under "What Every Health Officer Should Know") included: "Developments in Public Health Education."

A breakfast session: "Community Education in the Control of Syphilis."

Food and Nutrition and Child Hygiene Sections, and Public Health Nurses (in a nutrition program) included: "Nutritional Education in the Home," and "Education in Nutrition by Private Agencies."

Public Health Today (a special session) included: "The Nurse an Interpreter of Health."

American Association of School Physicians: "Professional Education and Qualifications for the Administration of School Health Programs."

National Organization for Public Health Nursing included: "A Proud Heritage—A Pageant on the History of Nursing."

Radio Program included local and network broadcasting at several periods of 5 days, starting before the convention opened.

Editorial Board of American Journal of Public Health: a session on past performance and future policies.

The Public Health Education Section presented what follows:

Health Education Institute covering parts of 3 days.

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N.Y.

"Health Education Exhibits" (a committee report).

"Evaluation of Public Health Education Methods" (a committee report).

Buffet Supper: a delightful opportunity for acquaintance between Section members and friends. Out-of-office sidelights were thrown on about a dozen of our members who told briefly about their hobbies.

"Developing Public Health Education Interest in the *American Journal of Public Health*" was a valuable hearing called by the Section Committee on Publications.

A "Testimonial Luncheon" to the editor of this department included an address on "Public Relations for Public Health."

"Results of Mass Education for Tuberculosis Prevention in Detroit."

"Visual Education for Schools."

"New Program of the National Education Association."

"The Health Education Institute" (a committee report).

"Relations with the Child Hygiene Section" (a committee report).

"Section Objectives" (a committee report).

"The Box-Office Appeal of Health Movies" (with showing of March of Time sequence on cancer).

"Publications for Health Education" (a committee report).

"Window Displays for Health Education."

"Clinic on Printed Matter."

"Clinic on Posters."

We give the health education program in detail because it could not be fully announced in the advance program. We wish to tantalize those who failed to get to New York, hoping that they will start planning to be in Kansas City in 1938. Then we hope that program planners of all the sections will study how health education may be placed on their 1938 programs.

And third, it is hoped that some of the topics listed above may be taken over into various state and national meetings of health workers and of social workers.

The 1937 Scientific Exhibits—The array of scientific exhibits has rapidly expanded in quantity and quality. Represented were the results of research, the high points in new or pressing problems, the graphic portrayal of administrative procedures, the display of services and aids available to health agencies, and examples of popular propaganda.

The exhibits provided object lessons in both good and bad practice in graphic presentation. It would be extremely helpful if the committee could find a way for calling attention to the good points in specific exhibits.

Health Education and Publicity Headquarters, 1937—For some years now health education has been assigned a good sized space for displays and consultation at the Annual Meeting.

Included were numerous classified portfolios with samples and technical information, including a group of exclusive health material made up especially for the occasion. All of these portfolios were provided by the Social Work Publicity Council.

Additional collections came from local, state, and national health agencies. There were new posters or exhibits offered to health workers from state or national sources. A collection of special binders, collected by Baxter K. Richardson of Illinois State Department of Health, outlined and illustrated the press services of the more alert state departments. One scrap book was exhibited by a young woman as an example of what might be done by a lay enthusiast quite without stimulus from a health agency. Marion McKinney, Westchester County Department of Health, White Plains, N. Y., gave several hours every day to a valuable demonstration of the use of the fret saw, and other equipment and materials in making effective placards and posters.

A bad cold kept Mrs. Hilton J. Shelley of the Middletown, N. Y.,

Health Department, from carrying on the demonstration of how to get good and unusual mimeographing.

Motion Pictures at the A.P.H.A.—Probably the most attractive program yet presented at an Annual Meeting was given in New York, October 5–8. A picture was shown on the hour, every hour daily, from 9:00 A.M. through 5:00 P.M. Projection was supplied by A. C. Barnes, 405 Lexington Ave., New York, N. Y., and the program was handled by George Grogan, New York State Department of Health, to whom thanks are due. Here are the pictures:

"Milk Parade with Lowell Thomas." Sound. Story of milk from the cow to the doorstep. Exhibited by Milk Industry Foundation, Chrysler Building, New York, N. Y.

"Modern Dental Care." Silent. Exhibited by Murry and Leonie Guggenheim Dental Clinic, 422 E. 72d St., New York, N. Y.

"Maternity." Silent. Essentials and significance of prenatal care for laymen. Exhibited by South Carolina State Department of Health.

"Germination of Bacterial Spores." Silent. Polar, equatorial, and stretching types of germination shown. Prepared by Dr. S. Bayne-Jones, Dean of Yale Medical School. Exhibited by Dr. Robert S. Breed, New York State Agricultural Experiment Station, Geneva, N. Y.

"The Story of My Life by Tee Bee." Sound version of a well known picture. Exhibited by State Department of Health, Albany, N. Y.

"Science of Modern Medicine." Sound. Syphilis and gonorrhea; reproduction. Exhibited by American Social Hygiene Association, 50 W. 50th St., New York, N. Y.

"Henry Street Visiting Nurse Service." Silent. Seven typical scenes. Exhibited by Henry Street Visiting Nurse Service, 99 Park Ave., New York, N. Y.

"Syphilis, Nature, Prevention, Treatment." Silent. For the general public. Exhibited by U. S. Public Health Service, Washington, D. C.

"The Eighty Years." Sound. Vital moments in history; achievements of science and industry. Exhibited by Bureau of Nutrition, Borden's Farm Products, 110 Hudson St., New York, N. Y.

"Morning Until Night." Silent. Infant care for school girls and mothers' groups. Prepared by University of Wisconsin. Exhibited by Wisconsin State Board of Health.

"Parks and Playgrounds of New York City." Silent. Exhibited by New York City Department of Parks, 64th St. and Fifth Ave., New York, N. Y.

"The Invisible Handicap." Silent. Hearing conservation program in New York City schools. Exhibited by New York League of the Hard of Hearing, 480 Lexington Ave., New York, N. Y.

"Syphilis of Central Nervous System." Silent. For the medical profession. U. S. Public Health Service, Washington, D. C.

"Far All Our Sakes." Talking slide film. Syphilis: nature, need for early diagnosis, and care. Exhibited by American Social Hygiene Association, 50 W. 50th St., New York, N. Y.

"Cross Connections That Cause Contamination." Silent. Health preservation through elimination of faulty plumbing. Sponsored by Copper and Brass Research Association. Exhibited by Penfrase Specialties, 101 Park Ave., New York, N. Y.

"Public Health in New York State." Sound. Important projects or activities of 8 divisions of State Department of Health. Exhibited by New York State Dept. of Health.

The New York State picture was shown also at hourly intervals in connection with an exhibit of the State Department. The "March of Time" sequence on cancer was shown at a luncheon of the Public Health Education Section. Motion pictures or slides were shown at various sessions of sections of the Association.

That Was Not Health Education—Due to a misunderstanding as to the nature of the opportunity some teachers encouraged school children to visit the exhibits at the A.P.H.A. Annual Meeting in New York.

We hereby urge that local committees in Kansas City and other future convention cities *take definite steps to discourage such visits.*

Boys and girls with shopping bags, crowding around displays and reaching for whatever printed matter or food samples are available, are not experiencing health education.

The accumulation of miscellaneous advertising matter, professional publications, and printed matter offered for the use of delegates is not particularly helpful to the young people.

During several long periods about all that those in attendance at some booths could do was to try to keep valuable books and other publications from being carried off. During such periods but little professional service could be rendered to delegates.

On the other hand, visits by teachers interested in health education would have been welcomed by many of the technical and scientific exhibitors. Much was to be seen and much was distributed which teachers might use to advantage. So, send the teachers next year, but please make very clear that the children should stay at home.

"Your Health!" a New Radio Program—A notable development in health broadcasting is the 1937–1938 program presented by the American Medical Association and NBC over the Red network. The series of dramatized health messages is intended to furnish graphic supplementary material for health teaching in junior and senior high schools. Much of the material is expected to be usable in the higher elementary grades. Naturally this adaptability to school use should not lessen its interest and value to mothers and housewives.

The program is broadcast every Wednesday from 2:00 to 2:30 P.M., eastern standard time. For a list of stations to which the program is available see *Hygeia*, or write to A.M.A., 535 N. Dearborn St., Chicago, Ill. However, it is important to note that local broadcasts in every community depend solely upon the local station management. Promotion of interest in the series should enlist schools, parent associations, and other interested groups throughout the station territory. Letters and resolutions should be addressed to the station to insure all the broadcasts throughout the season. Here is an excellent opportunity for state departments to back up local efforts through enlistment of interest beyond city limits.

The October theme is "Personal Health"; for November, "Hygiene"; with "Diet" in December.

Oct. 13—"Learning about Health"; Oct. 20—"Growing for Strength and Beauty" (favorable and unfavorable factors in growth and the maintenance of normal weight); Oct. 27—"Seeing and Hearing Well" (hearing and vision; how to conserve these; how to recognize deviations; how to prevent loss); Nov. 3—"Striving for Better Bodies" (so-called physical defects; their recognition; what can be done about them).

Nov. 10—"Playing for Fun" (health values and hazards in sports and recreation, including football); Nov. 17—"Fresh Air, Fresh Clothes and Fresh Skin" (ventilation; clothing; bathing); Nov. 24—"Rest, Relaxation, Refreshment" (all work and no play, or all play and no rest—bad for health); Dec. 1—"Tuberculosis, Foe of Youth" (how bad habits of hygiene and unwise living, plus infection, favor tuberculosis).

Dec. 8—"It Takes All Good Foods" (a well rounded diet and how to get it); Dec. 15—"Vitamins, Minerals and Common Sense" (more about a balanced diet in special relation to minerals and vitamins); Dec. 22—"Dietary Fads" (facts vs. fallacies in relation to prevalent false notions on diet); Dec. 29—"Milk from Farm to Table" (the production, transportation, pasteurization and home care of milk; its place in the diet; processed milks).

Please report any parent listener groups to the editor.

Consumer Studies in High School—Health education in the form of consumer studies of products and advertising in high schools is not new. More recently courses in consumer

economics have given attention to products which may affect health. A helpfully detailed account of one such course is "The Consumer Course at Hiram High," by C. Boroski, in *Junior Red Cross Journal*, Washington, D. C. Oct., 1937. *15 cents.*

Several paragraphs may be quoted to illustrate possibilities in dealing with products of health interest. The class made a study of advertisements in one issue of a metropolitan daily.

> After this study was completed, the tabulated results indicated that there were approximately two dozen advertisements which the class judged as questionable. As 90 per cent of these advertisements were either for medicines or cures of some kind, it was decided to send them to the American Medical Association and ask for an expert opinion on the products advertised. The association responded by sending a statement about each product. . . . Not all of the products were condemned, but the large majority were. The committee in charge of this project pasted each advertisement at the top of a sheet of typewriting paper with the comment of the Medical Association just below it. These sheets were then bound into a booklet to add to the high school's consumer library.
>
> The project was not ended, however. The booklet was sent to the Better Business Bureau of a near-by city with a request for further information about the products. The Better Business Bureau, in reply, said they had nothing to add to the information given by the A. M. A., but asked permission to show the booklet to the advertising manager of the newspaper in which the advertisements had appeared.

Again the class took up toothpastes.

> The whole class read reports of the Council on Dental Therapeutics of the American Dental Association and found that many widely advertised dentifrices are not approved by this association because of the unfounded claims made for the product. The accuracy of advertising claims is very important to consumers because they want to buy a dentifrice on the basis of what it is and what it will do, rather than on some fanciful claim. One committee made rough comparisons of the abrasive quality of tooth powders, and studied the costs of the different brands.

The act to control food, drugs, and cosmetics then being considered by Congress

> . . . came up for extended discussion. Propaganda both for and against the new Food and Drugs Act and copies of congressional hearings on the bills then before Congress were studied. Pictures of exhibits prepared by the Food and Drug Administration, Washington, D. C., showing the limitations of the Food and Drugs Act of 1906, were used for bulletin board displays. We also had copies of the bills themselves so that we could see what an act of Congress looks like. Some of the class wrote their Congressman urging him to support a good Food and Drugs Act.

The idea might well be adopted in part by teachers of health education, and the plan as a whole may find a place in certain groups of adults. School clubs might be interested, and it might not be difficult to gather groups of young adults for the purpose of pursuing studies and experiments such as are described in the article.

That such study is needed receives emphasis from the publication of an article on advertising and merchandizing in a recent issue of a professional health journal. According to the author "self-appointed consumer defenders" make "absurd" claims. During the food and drug control battle in Washington the "self-appointed producer and advertiser defenders" were so "absurd" in their statements that a leading advertising magazine repeatedly rebuked them. And after the battle was over numerous advertising and trade associations expressed warnings to their members against doing what the public had previously been assured did not occur. Much in the article is illogical, or based upon limited understanding of the subject.

Even small groups of high school students who have done first hand study of consumer problems with a health angle should bring strong reinforcement to public health education.

Good—But Better Next Time—The annual report of Fresno County Health Department, Fresno, Calif., is well mimeographed in 10 pages. It represents the simplified and inexpensive form which might be adopted by any county or small city department. Hence we venture to point out how Fresno or any other county might do the same report a bit better another year.

1. Discard the conventional, dull looking, near white, mimeograph paper, using a tinted paper of which there is a variety made for mimeographing. Or a light weight bond, inexpensive and agreeable in appearance. (A list of some suitable papers will be supplied if you care to send an addressed and stamped envelope to Social Work Publicity Council, 130 E. 22d St., New York, N. Y.)

2. If you could add just a little to the cost, use a printed cover, or one done on the multigraph with display type made for multigraph use.

3. Run the two pages of text in advance of the statistical tables.

4. Allow the two pages of text to run part way over a third page, so that the pages will not run so close to the top and bottom.

We believe that even two or three of the above suggestions would add much to the appearance of the report in proportion to the cost.

Syndicating Health Information—The "Annual Directory of Syndicated Features" appeared as a supplement to *Editor and Publisher*, Times Bldg., New York, N. Y. Sept. 25, 1937. *10 cents.*

The authors of health columns are given here as they are listed in the Directory:

"Dailyette," by John C. Kraus; "Dr. Bundesen—Health," by Herman Bundesen; "Family Doctor," by J. J. Gaines, M.D.; "Health," by Dr. Cutter; "Health and Beauty," by Dr. Sophia Brunson; "Health Column," by Dr. Logan Clendening; "Here's to Your Health," by Dr. Frank McCoy; "Housing Clinic," by Dorothy Ducas, Elizabeth Gordon; "How's Your Health?" by Dr. Iago Galdston; "Keeping Fit," by Artie McGovern; "That Body of Yours," by Dr. James W. Barton; "The Family Doctor," by Dr. Morris Fishbein; "Weekly Article," by John C. Kraus; "Your Good Health," by Dr. C. N. Chrisman; "Your Health and Your Weight," by Dr. James Barton; "Your Health," by Dr. Royal S. Copeland; "Your Health," by Dr. Robert B. Stewart; "Your Good Health," by Dr. C. N. Chrisman; "Your Health," by Dr. Alexander Goodman; "Your Weight and Your Height," by Dr. James B. Barton.

A certain amount of health material will be found in some columns in other classes: beauty, children, food, science.

The Directory also lists news services, photographic services, etc.

Incidentally, Dr. Galdston's column is syndicated by Associated Press Feature Service, and not by the New York Academy of Medicine.

Why Addresses Are Given—We try to give usable and easily understood addresses for most every publication or activity mentioned in this department of the *Journal*.

This is done so that readers may find it easy to write to any agency or other source to which reference is made.

In a few cases we mention something without an address, either because none is available without too much effort, or because it is not worth while to write for what is mentioned.

The editor of this department does not supply anything unless his address is given specifically for that purpose. It will save you time and extra trouble if you address your letters direct to whoever or whatever is named as the source of the material in which you are interested.

There Is Nothing To Take Its Place—At least we know of nothing available which might replace the series of bibliographies, issued first by American Child Health Association, and more recently by School Health Education Service. In addition to their un-

equaled form, they were revised annually, and so could be kept up to date in contrast with the reading and source lists contained in health education books.

School Health Education Service has been wholly discontinued. No further correspondence should be addressed to it. We can only hope that the American Association for Health and Physical Education, a reorganized department of the National Education Association, may revive some of the discontinued services.

Health Education in Journal, October, 1937—In "The Early American Public Health Movement," by Shryock, mention is made of the national sanitary conventions (page 969):

> . . . the members of the conventions were alive to the need of educating the public, although this is now viewed as a "recent" function of health administration. To this end, they encouraged the formation of "sanitary associations" in large cities, similar to the "health of towns" societies in Great Britain. An apparently flourishing association of this sort, set up in New York City before 1860, was active in the drive which finally led to the reform of health administration in the metropolis.

In "Vaccines Against the Common Cold," by Bristol (page 987):

> . . . reducing absenteeism due to colds is an undertaking that requires the coöperative efforts of individual employees and of management. The employees' responsibilities should be concerned with learning everything possible with reference to colds and their prevention, control, and medical treatment; and putting the knowledge gained into continuous practice. Management's opportunities in such a coöperative program will be found largely in assisting employees to learn all of the facts regarding colds; in calling attention periodically to the seriousness of the problem and the need for medical care; . . . all of which involves a well rounded program of health education . . .

In "Is Routine Examination and Certification of Food Handlers Worth While?" by Best, the 4th in a 5 point program of protection for the public is stated on page 1006 to include instruction in personal hygiene, instruction in handling food, and the provision of instruction pamphlets and placards. Practical details are outlined.

In "Books and Reports" see (page 1054) a review of "Group Leadership."

On page 1064 is an announcement of "Health Conservation Contests for Syphilis and Tuberculosis."

Hygeia, September, 1937 — For education and reference see in *Hygeia*, 535 N. Dearborn St., Chicago, Ill. (Sept., 1937; *25 cents*):

> Learning about health (what people don't know) . . . The health chaser (the hypochondriac) . . . What can be done for arthritis? . . . Can diet influence cancer? . . . Sinus disease . . . Sane manias: hobbies of varied personalities . . . Don't let your child get fat! . . . Bad habits in good babies . . . Dressing up the diabetic diet . . . Gelatin: the chameleon of foods . . . Thomas Sydenham (father of clinical medicine) . . . New books on health . . . Typhoid (in story form) . . . X-rays and radium in medicine . . . Questions and answers.

Under "School and Health":

> Getting perspective in health education . . . The school physician and classroom teacher coöperate . . . Laying the groundwork for a nutrition program . . . Health heroes of the past speak (a school broadcast) . . . All in the day's work (as seen by a health teaching supervisor).

DATES AHEAD

November brings the high point in the 1937 Mobilization for Human Needs, including the raising of funds for many private health agencies.

Nov. 11: Opening of Red Cross Roll Call.

Nov. 14–21: National Book Week. Effective planning may bring desirable books for health institutions, and may result in the display and sale of ap-

proved health books, and may offer some opportunities for advising against undesirable books.

Nov. 25: Thanksgiving Day may stimulate some original minds to putting the Thanksgiving health message into some new form.

Nov. 26: Christmas Seal Sale begins.

Dec. 22: The first day of winter, providing the opportunity for a new accent on cold weather health needs.

The health officer and the health association executive may usually find some reasonable tie-up with the above and other events. In some cases a few words expressing a common interest and appreciation will be worth while.

And in community celebrations health executives or other representatives of health agencies should be found upon the "general" or "advisory" committee, as well as among the group which plans any feature which has a health angle.

MOTION PICTURES

New pictures produced in other countries are announced under "Public Health Administration" in *Venereal Disease Information*, U. S. Public Health Service, Washington, D. C.

"Animation Made Easy," by F. C. Houghton, explans how an average amateur may produce simple animation effects. In *Movie Makers*, 420 Lexington Ave., New York, N. Y. Sept., 1937. *25 cents.*

"Nurses in the Making" is a vocational guidance film of interest to girls and their adult friends and advisers. It is 2 reels, silent, 16 mm., produced by Harmon Foundation, 140 Nassau St., New York, N. Y., in coöperation with New York Hospital School of Nursing.

Beginning with scenes showing some of the fields of service open to the nurse today, the film answers the questions, "What sort of girl should be a nurse?" and "What are the requirements for admission to a good school of nursing?" The major portion of the film portrays highlights of a modern nursing curriculum.

The picture takes the nurse through her hospital training, her experience in the outpatient department, 2 months with a visiting nurse association, and a period of care of patients with mental disorders.

BOOKS AND REPORTS

Diseases of the Heart—*By Sir Thomas Lewis. New York: Macmillan,* 1937. 289 pp. Price, $3.50.

No one connected with medicine needs enlightenment concerning Sir Thomas Lewis, the illustrious author of this book, which is a concise and simply written account of his very wide experience in the study of heart diseases. It is based on what he has seen and found to be true in a wealth of clinical material.

Dr. Lewis purposes to acquaint the practitioner with the common cardiac conditions, their diagnosis, treatment, and management. He considers all the important ailments of the human heart, including angina pectoris, pulse irregularities, arrhythmias, essential hypertension, and the thyrotoxic state. The chapters of arrhythmias, cardiac asthma, and essential hypertension are the high lights of the book.

The chapter on Essential Hypertension is prefaced with a general statement about high pressure, setting forth the various conditions with which it might be associated. Brief discussions of the pathological anatomy of the body in hypertension, including hypertrophy of the heart, arteriosclerotic and renal changes, follow. Next are given the symptoms found in hypertension, emphasizing that it is not unusual to discover hypertension in routine examinations conducted for insurance or other purposes, although such patients may have few, if any, of the usual symptoms. Emphasis is laid on well known symptoms such as headache, nervousness, fatigue, palpitation, and disturbances of vision. The careful practitioner may recognize high blood pressure in various ways, including detection of accentuation of the second cardiac sound, high pulse tension, and sphygmomanometry.

While the author, by repeated illustration and reference, emphasizes the value of electrocardiography, the inclusion of an entire chapter on this subject, written in the same simple and concise style, would be welcomed by the medical profession.

Particularly valuable for everyone are the bits of counsel found in the section on "Conversing with the Patient and His Friends," and the statements reproaching the profession for its neglect of early signs of heart disease.

Students and practitioners alike will find this volume invaluable. No one can turn its pages without marveling at its content and form. Unimportant matters not belonging in such a masterful presentation are omitted. Its striking simplicity and conciseness make this second edition one of the most outstanding contributions to medical literature on the ailments of the human heart. WILLIAM B. BROWN

Psychiatric Social Service in a Children's Hospital—*By Ruth M. Gartland. Chicago: University of Chicago Press,* 1937. 105 pp. Price, $1.25.

This volume gives an account of 2 years of service rendered children in the Child Guidance Clinic of Bobs Roberts Hospital of the University of Chicago Clinics. An introduction deals with the recognition of the necessity for combining psychiatric and pediatric knowledge and skill in the furtherance

of the growth and development of children and with the functions of the psychiatric unit.

Then follows a statistical analysis of patients referred and treated, a discussion of concerns of patients and parents, services rendered, and changing treatment trends with case illustration. Implications of this study, given in the conclusions, are related to future clinical procedure, and to service in the community.

The report will be of special interest to those public health workers who are giving consideration to community mental hygiene programs and to the social aspects of public health.

Many pages of the book are difficult to read because the lines are too long and close together for the size of type and offset process used. It is unfortunate that such a constructive analysis of a timely subject could not have been printed according to standards which would pass the scrutiny of the National Society for the Prevention of Blindness. IRA V. HISCOCK

The Traffic in Health—*By Charles Solomon, M.D. New York: Navarre Publishing Company, Inc.*, 1937. 393 pp. Price, $2.75.

Even those who have followed the campaign of the American Medical Association against quackery, frauds and fakes have something to learn from this book. It shows a vast amount of patient study, careful selection of material and facts, and an orderly arrangement which makes the presentation of them doubly striking. The headings and sub-headings add to this effect.

The general problem of the patent medicine racket is first discussed, followed by statements of what might be and can be done. A chapter is devoted to "Disease and Its Treatment," which lays a foundation for which is said later on individual fake remedies. There is sound consideration of The Habit-Formers, Sleep-Producers, and Pain-Killers, pointing out their dangers. Under this heading, that gold mine, "Painful Menstruation," is duly treated of, and once again we are told of Mrs. Pinkham and her wonderful remedy. The danger of innocent women becoming drug fiends and alcoholics is stressed.

The rich field of diet fads is well handled, introduced by a scientific statement concerning diets and foods. Each subject is introduced with a statement of the facts known through careful study by scientists. For example, the chapter on reducing discusses the nature of obesity; that on infections, the nature of infection and immunity, before going on to tell of the frauds which are foisted on an entirely too willing public.

One of the most striking chapters is on cosmetics, though everyone knows of the tremendous business now being done in all sorts of beautifiers. There is a list of well known cosmetics given, with their selling price and the cost of manufacture. If we could only make the ladies believe what is so well known, they would go to reputable druggists and not buy highly advertised products. For example, one much advertised preparation which sells for $3.00, costs 39 cents, including the container; another which sells for $1.75, costs 9 cents, etc. "Today women spend something in the neighborhood of two billion dollars annually for something that cannot be purchased on the market—beauty."

The book contains far too many interesting and worth while facts for mention, and many striking points are made. In many countries, for example, only a thoroughly trained apothecary is allowed to dispense preparations which in this country are sold in grocery, department, and ten cent stores. "Proprietary" medicines, a name which fools many people including doc-

tors, are discussed. Out of a business in them of more than $172,000,000 in 1931, more than $52,000,000 was due to prescriptions by physicians. It is estimated that the American public spends $360,000,000 annually on patent medicine. One cannot but remember the witty statement of a Chinese Minister to the United States, who said: "You think the Chinese are uncivilized because they bind their women's feet. What about your women who bind their waists and your people who take such enormous quantities of patent medicines?"

The public should remember that it is paying millions and millions of dollars for advertising. Many of our otherwise reputable journals publish advertisements of the most arrant frauds. Newspapers are said to receive $700,000,000 per year, magazines $210,000,000, while mail advertising runs up to $400,000,000.

What was said concerning the selling price and cost of cosmetics is true of patent medicines. Laxatives and cathartics often contain Glauber's and Epsom salts. Certain widely advertised, so-called "mineral salts" sell for $1.50 a package and cost only 1½ cents to make; another sells for $1.00 and contains chemicals worth ⅔ cent. Of late, phenolphthalein, a coal-tar derivative, has become popular as a laxative and is sold under 50 different names. It sometimes produces very injurious results, yet is sold without any restrictions.

The author tells facts which should be known to everyone. The courts have defined the word drug as: "Some agency designed for the treatment of disease." Consequently, supposed remedies for physical defects do not come under the law. In the same way, in spite of the many poisonous ingredients in face lotions, hair dyes, etc., they have been exempt from the Food and Drugs Act. Any attempt to strengthen the law is fought vigorously by the manufacturers, one of whom even went so far as to complain that those enforcing the laws were "prejudiced in the interests of the public." Deserved tributes are paid to Dr. Harvey W. Wiley and to the Food and Drug Administration. Our laws consider the legal side rather than the scientific. We get more help in combating frauds from the Post Office Department, which denies the mails to frauds, than from others who would seem to be the ones chiefly concerned. In speaking of "Tanlac," which sold in 1922 for $2,000,000, the author says: "A monument commemorating public stupidity should have been erected with part of the proceeds."

At the close is an excellent chapter on "Medical Aid Till the Doctor Comes." An excellent bibliography and index is appended. Altogether, the book can be highly recommended and we wish for it a wide distribution. Unfortunately, it will be read too entirely by those who do not need it and too little by those who do need it. It is certainly one of the best expositions of this cold-blooded and often conscienceless traffic in health and life.

MAZŸCK P. RAVENEL

How the President, Thomas Jefferson, and Doctor Benjamin Waterhouse Established Vaccination as a Public Health Procedure —*By Robert H. Halsey, M.D. Published by the Author, New York*, 1936. 58 pp. Price, $1.00.

This is a valuable historical contribution to that ever interesting subject, vaccination against smallpox. We are told that the published letters of President Jefferson to Dr. Waterhouse can be readily found, but search at Charlottesville, Va., New York, Boston, Worcester, and New Haven failed to reveal any of the letters of Dr. Waterhouse to the President, or references to them. They

were finally located, with one exception, in the Library of Congress. The author has made them available to the general reader.

In addition to these letters, the pamphlet contains much valuable history, including a sketch of President Jefferson and his many activities, which incidentally brings in the names of a number of well known medical men and patriots of that era. There is a sketch of Dr. Waterhouse which gives us much of the history of the beginning of medical teaching in New England.

Perhaps most of us have never realized how much we owe to President Jefferson in the introduction of vaccine against smallpox. After failing to enlist active support from a number of influential people, Dr. Waterhouse appealed to President Jefferson, received at once "complete and enthusiastic accord," and within 24 hours, the President wrote the letter initiating the definite plan which aroused the interest of the profession and laity of Washington, Virginia, Philadelphia, and other places.

To Dr. Waterhouse is due, therefore, the credit of devising the method and inviting Jefferson to lend his influence in the execution of the procedure and thus expediting the introduction of vaccination as a preventive of smallpox and establishing it as a recognized public health measure.

The pamphlet is well printed and illustrated with reproductions of a miniature of President Jefferson, a portrait of Dr. Waterhouse, and the medical diploma issued to him by the University of Leyden, April 19, 1780. This pamphlet embodies a lecture given before the New York Academy of Medicine, March 14, 1934, and was published in 1936, but has just come to our hands. MAZÝCK P. RAVENEL

Fumigating Ships—The National Safety Council, 20 North Wacker Drive, Chicago, publishes a 6 page Industrial Safety Series Number, Mar. 1, giving the general background for ship fumigation, the nature of accidents caused by fumigation, precautions to be followed, the gases employed with particular mention of sulphur dioxide, carbon monoxide, hydrocyanic acid, and cyanide with chloro-picrin; also the use of gas masks and hose masks. The items compose 39 numbered paragraphs. There are 8 figures, some of them depicting safety instruction cards.

EMERY R. HAYHURST

Maternal Care — The Principles of Antepartum, Intrapartum and Postpartum Care for the Practitioner of Obstetrics—*Dr. F. L. Adair, Editor. Approved by the American Committee on Maternal Welfare, Inc. Prepared by Drs. W. C. Danforth, G. W. Kosmak, R. L. DeNormandie, F. L. Adair. Chicago: University of Chicago Press,* 1937. 93 pp. Price, Cloth, $1.00, Paper, $.25.

This booklet is a résumé of the pertinent problems which confront the family physician when he assumes the obligations of maternal care and offers guidance. It further serves to give him a measure for interpreting the adequacy of the service he is rendering to his maternal patients. One is impressed with the practical and conservative rationale of procedures and treatment which makes it possible for the family physician to give good obstetrical care for usual cases and point the way for care of emergencies for which we may seek the assistance of those more skilled in obstetrics.

For the public health nurse and the bedside nurse who render service to maternal cases the booklet outlines the basic principles of good maternal care in language which can be readily understood, giving specific and detailed instruction regarding prenatal instruction for the mother, preparation for de-

livery in the home, and postpartum care so that they can intelligently serve the attending physician and relieve him of some of the burden of details. They can also be better prepared to meet emergencies while waiting for the doctor and interpret danger signals which necessitate immediate medical consultation.

For the public health worker who must supervise programs of maternal care, this manual gives the basis for interpreting obstetric practice and maintaining standards in keeping with sound principles of adequate care. Many state health departments in coöperation with state medical societies are offering short courses in obstetrics for physicians who do not have close relationship with the large maternity services and whose practice is largely limited to home deliveries. The manual might well serve as an outline and summary of lectures and discussions for use in these courses.

Detailed information is given for history taking, physical examination, record keeping, and procedures in each phase of pregnancy—antepartum, intrapartum, and postpartum. One is amazed that one small volume can contain so much.

For those who question the relative value of prenatal care these authors point out that such care is absolutely essential for a considerable number of women if they are to avoid calamity, and unless routine, careful examination is made of all pregnant women it is impossible to determine which need care. Many studies of maternal mortality point to the responsibility of the physician and indicate that sane practices in obstetrics must be adhered to if maternal mortality rates are to be lowered. Studies of maternal care indicate that too often such practices are not carried out.

If a physician accepts pregnancy cases he must accept the entire responsibility. If the patients are unable to recompense him sufficiently for the many necessary services, and if he is unwilling to contribute his services, he should direct them to other sources where they may have the care that every pregnant woman needs.

In considering the argument that facilities for good care are not available and the trend in some localities is to insist on hospitalization for all pregnancy cases, the authors say that "good intrapartum or delivery care is possible without aseptic conveniences and other resources of a hospital. It is possible in normal cases to maintain the principles of surgical asepsis and give a woman good obstetric attention in the home." Fortunately the majority of cases are normal.

The problems of sepsis, the chief cause of maternal deaths, are well known. Perhaps it will be well to listen to those investigators who insist that so-called "autogenous" infections can eventually be traced to a definite point of entrance. Perhaps more emphasis on the use of a mask in the delivery room, without which the surgeon would never appear in the operating room, might reduce these "autogenous" infections.

The third great cause of maternal deaths is hemorrhage, usually an emergency which must be met as such. The value of immediate transfusion has been demonstrated beyond doubt. In the discussion of transfusions the authors are not quite clear. It is a moot question whether universal donors should be used except in emergency. The statement "Group IV is to be preferred" will probably be challenged by the pathologist, and unfortunately Group IV may refer to either the Jansky or the Moss classification. Undoubtedly Group IV Moss is meant or Group I Jansky or Group O International Classification.

Maternal mortality rates are much too high in the light of present knowl-

edge regarding the physiology of pregnancy and the mechanism of labor. The story of maternal morbidity has never been told. If it were told probably even greater emphasis would be given to prenatal and postpartum care.

If the principles outlined in this manual are followed by the practitioners we can hope for lowered maternal and infant mortality and morbidity rates, and to make child bearing relatively safe. Every physician who practises obstetrics might well study the manual most carefully, as well as nurses and public health workers.

MARTHA M. ELIOT

Proceedings of the Twenty-fourth Annual Meeting of the New Jersey Mosquito Extermination Association, Atlantic City, Mar. 17–19, 1937—*New Brunswick, N. J.*, 1937. 238 pp.

The *Proceedings* contains papers read before the annual meeting of the New Jersey Mosquito Extermination Association, one of the major meetings of mosquito control workers.

The papers present much practical information and considerable scientific data of interest to mosquito workers. Discussions of the papers are enlightening and afford an opportunity to learn of experiences elsewhere and of modifications of established mosquito control principles employed over a wide variety of sections. Mosquito control workers can ill afford not to peruse the present issue. Past copies should prove valuable as references.

An interesting topic presented is the protection from mosquitoes at outdoor meetings, an activity which would popularize any mosquito control campaign by affording temporary protection to outdoor public gatherings. Such protection would be especially valuable in demonstrating the desirability of mosquito-free environments.

A summary is given of work on mosquitoes throughout the world and should prove a boon to the busy worker who has little time to peruse the literature. Much contained in the summary is not available elsewhere, having been gathered direct by letter.

Valuable information is presented on directions for applying mosquito repellents for protection of outdoor gatherings; on the relation of mosquito prevalence to human comfort; the successful use of publicity in mosquito control campaigns; new and significant mosquito control developments in this country during 1936; the effect of rainfall on mosquito prevalence; studies of mass mosquito migration across open bodies of water; relation of mosquito control work to conservation activities, and other equally important subjects.

J. LYNNE ROBERTSON, JR.

Personal Hygiene—*By C. E. Turner. St. Louis: Mosby,* 1937. 335 pp. 3 color plates, 84 ill. Price, $2.25.

This book was prepared chiefly to give college students the basic health knowledge appropriate for the educated man and woman. It represents a revision, enlargement, and adaptation of Part I of the earlier book by this author on *Personal and Community Health.* Consideration is given to anatomy, physiology, and other underlying sciences to clarify and support the health teaching.

Introduced by a stimulating discussion of health values, the functions of the organs of the body are described in relation to such topics as nutrition, digestion, respiration, circulation, excretion, mental activity, reproduction, and exercise. Of the 20 chapters, the last 2 deal with responsibility for health maintenance, and with communicable diseases and immunity. The formation of proper health habits is stressed, but advice is lacking regarding such a problem as the selection of pasteurized

milk, more closely related to community health. The volume is well illustrated, and each chapter is followed by a list of references useful to the teacher or to the student who desires supplementary reading. This is a practical text, written in an interesting, not-too-technical, style, and well printed.

IRA V. HISCOCK

BOOKS RECEIVED

BIOLOGICAL LABORATORY TECHNIQUE: AN INTRODUCTION TO RESEARCH IN EMBRYOLOGY, CYTOLOGY AND HISTOLOGY. By J. Brontë, B.A., B.Sc., D.Phil.(Oxon.), M.A., Ph.D. (Dubl.), D.Sc.(Lond.). New York: Chemical Publishing Co. of New York, 1937. 130 pp. Price, $3.00.

BOARD MEMBERS' MANUAL: FOR BOARD AND COMMITTEE MEMBERS OF PUBLIC HEALTH NURSING SERVICES. Prepared by National Organization for Public Health Nursing. (New 2nd ed.) New York: Macmillan, 1937. 173 pp. Price, $1.50.

THE FAMILY IN HEALTH AND IN ILLNESS. By Florence Brown Sherbon. New York: McGraw-Hill, 1937. 516 pp. Price, $3.50.

A FIVE-YEAR STUDY OF TUBERCULOSIS AMONG NEGROES. New York: National Tuberculosis Association, 1937. Apply to State Agency.

GENERAL HYGIENE AND PREVENTIVE MEDICINE. By John Weinzirl. Philadelphia: Lea & Febiger, 1937. 424 pp. Price, $4.00.

HOME ECONOMICS SERIES:

Junior Home Problems (rev.).	310 pp.	$1.12.
Junior Foods (rev.).	362 pp.	1.16.
Junior Clothing (rev.).	264 pp.	1.16.

By Kate W. Kinyon and L. Thomas Hopkins. Boston: Sanborn, 1937.

AN INTRODUCTION TO SOCIAL STUDIES. By Joseph K. Hart. New York: Macmillan, 1937. 203 pp. Price, $2.00.

LABORATORY DIAGNOSIS OF SYPHILIS. By Harry Eagle. St. Louis: Mosby, 1937. 440 pp. Price, $5.00.

MATERNAL DEATHS: THE WAYS TO PREVENTION. By Iago Galdston. New York: Commonwealth Fund, 1937. 115 pp. Price, $.75.

NUTRITION. FINAL REPORT OF THE MIXED COMMITTEE OF THE LEAGUE OF NATIONS ON THE RELATION OF NUTRITION TO HEALTH, AGRICULTURE AND ECONOMIC POLICY. Geneva, Switzerland, 1937. International Documents Service, Columbia University Press, 2960 Broadway, New York. 327 pp. Price, $2.00.

NUTRITIVE ASPECTS OF CANNED FOODS. Compiled by Nutrition Laboratory, Research Department of the American Can Company, New York, N. Y., 1937.

ON BEING A BOARD MEMBER. Prepared by Robert G. Paterson, Ph.D. Committee on Administrative Practice. New York: National Tuberculosis Association, 1937. Apply to State Agency.

THE PNEUMONOKONIOSES (SILICOSIS): LITERATURE AND LAWS. Book III. By George G. Davis, Ella M. Salmonsen and Joseph L. Earlywine. Chicago: Chicago Medical Press, 1937. 1033 pp. Price, $10.00.

PRINCIPLES OF MEDICAL STATISTICS. By A. Bradford Hill, D.Sc., Ph.D. London: The Lancet Limited, 1937. 171 pp. Price, $2.25.

PROCEEDINGS OF THE 1936 ANNUAL CONFERENCE OF THE NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS. Publication No. 245. New York: National Society for the Prevention of Blindness, 1937. Price, $1.00.

SAFETY PROGRAMS AND ACTIVITIES. By Florence S. Hyde and Ruth C. Slown. (rev. ed.) Chicago: Beckley-Cardy, 1935. 267 pp. Price, $1.25.

SAFETY THROUGH THE YEAR: AN ACTIVITY-TEXT-WORKBOOK—FOR UPPER GRADES. By Florence Nelson, Olis G. Jamison and Raymond E. Sparks. New York: McGraw-Hill, 1937. 128 pp. Price, $.48.

SOME FUNDAMENTAL ASPECTS OF THE CANCER PROBLEM. Edited by Henry Baldwin Ward. New York: Science Press, 1937. 248 pp. Price, $2.50.

THE SUBNORMAL MIND. By Cyril Burt, M.A., D.Sc.(Oxon.). (2nd ed.) London: Oxford University Press, Humphrey Milford, 1937. 372 pp. Price, $5.00.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Health Education for All—Urging a national program and national organization for promoting health education, the author points to the weaknesses of the present lack of a coördinated plan.

BOUSFIELD, M. O. The Negro Home and the Health Education Program. J. Negro Ed., July, 1937, p. 513.

New York's Venereal Patients—How a third of a million treatments for venereal disease per year are carried out, and how the corresponding epidemiologic and educational measures are conducted is reported in this account of the activities of the social hygiene bureau of the New York City Department of Health.

CLARKE, C. W. The New York City Plan for Combatting Venereal Diseases. J.A.M.A. 109, 13:1021 (Sept. 25), 1937.

About School Child Health—In a symposium on health problems in education, these questions were raised: Should the public schools which have only a part of all children for only a quarter of the day for only half the days in the year operate a health service, a police, or a social service? Since the family, the school, and the private physicians can assume only part of the total health responsibility, how much remains for public health? How far can the school go in improving nutrition of children and the community? Among other subjects, vision and hearing are brought into the discussion.

FERRELL, J. A. Control of Communicable Diseases in Schools.

MCLESTER, J. S. Nutrition Problems in Education.

NEWHART, H. Hearing Problems in Education.

JACKSON, E. Light in the Schoolroom.

ROGERS, J. F. Health Education and Health Services in Schools. J.A.M.A. 109, 11:835 (Sept. 11), 1937.

Not What to Think, But How—Contrasts in parallel columns, of the old approach and the newer methods of promoting school child health in rural schools.

HARRIS, R. F. New Ways for Old in Rural School Health. Pub. Health Nurs. 29, 9:506 (Sept.), 1937.

How to Raise Mosquitoes—Of use to very few sanitarians, these detailed instructions are here included chiefly because they contain so much that is new, at least to this reviewer.

JOHNSON, H. A. Notes on the Continuous Rearing of *Aedes Aegypti* in the Laboratory. Pub. Health Rep. 52, 35:1177 (Aug. 27), 1937.

Health Services versus Health Needs—Picturing the inadequacy of rural health services in a southern community, the survey points a lesson which is, no doubt, applicable the country over.

MOUNTIN, J. W., *et al.* Relationship of a Rural Health Program to the Needs in the Area. Pub. Health Rep. 52, 37:1264 (Sept. 10), 1937.

Infantile Paralysis Measures—In this Canadian symposium on poliomyelitis the discussions have to do with the statistics of the recent epidemic, the nature of the virus infection, the epidemiology and symptomatology of the disease, nasal spraying as

a prophylactic, and convalescent serum in treatment.

PHAIR, J. T., *et al.* Symposium on Anterior Poliomyelitis. Canad. Pub. Health J. 28, 9:417 (Sept.), 1937.

Selling British Public Health—One hundred English mothers were asked what the medical officer of health was: 65 had an idea more or less vague (mostly more) and 35 had no idea whatever. So a campaign was inaugurated to tell England what health services were offered and how the public might use them. The details are interesting.

RANKINE, P. S. The National Campaign to Encourage a Wider Use of Health Services. Pub. Health. 50, 12:371 (Sept.), 1937.

As Others See Us—Commendation of the Appraisal Form as an instrument for increasing the efficiency of health administration is doubly welcome, coming from one not identified with public health and appearing in the lay press.

RIDLEY, C. E., and HERBERT, A. S. Measuring Public Health Work. Public Management. 29, 9:270 (Sept.), 1937.

Breaking New Ground with Prontosil—Experimental studies are reported in which prontosil is shown to be therapeutically active against one virus disease. Newer derivatives were inferior.

ROSENTHAL, S. M., *et al.* The Chemotherapy of Choriomeningitis Virus Infection in Mice with Sulphonamide Compounds. Pub. Health Rep. 52, 36:1211 (Sept. 3), 1937.

Reporting Progress — Bird's-eye view of health education in the classroom here and abroad. On the whole, the prospect is encouraging.

TURNER, C. E. Present Trends in Health Education. Pub. Health Nurs. 29, 9:499 (Sept.), 1937.

About Detroit's Tuberculosis Problem — Tuberculosis control requires the discovery of the minimal case and the isolation of the infectious case. This necessitates money, of which there is so little, though plenty is spent for custodial care. Detroit was able to sell the preventive program to the city administration. What happened is interestingly told.

VAUGHAN, H. F., and DOUGLAS, B. H. Intensive Case Finding Work in Tuberculosis. J.A.M.A. 109, 10:771 (Sept. 4), 1937.

ASSOCIATION NEWS

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Applications close November 10, 1937. Address the Commission at Municipal Building, New York, N. Y.

WANTED:

(a) Public health physician; rural district, southern state; special training provided, $3,600–$4,800.

(b) Public health nurse to carry on prenatal nursing program; midwest.

(c) Woman physician; full-time appointment; public schools; East.

(d) Public health man experienced in teaching to head department of preventive medicine; class A school.

(e) Public health nurse for community nursing among Chinese children; Southern California.

(f) Bacteriologist and serologist; state public health laboratory; $1,800–$2,400.

Address # 26-PH, Medical Bureau, Pittsfield Building, Chicago, Ill.

POSITIONS WANTED

HEALTH OFFICERS

Experienced Health Officer who has completed Vanderbilt short course, 1936, will consider appointment. West preferred. **A320**

Physician, age 30; graduate of Indiana University; C.P.H., Johns Hopkins; available for full-time county health work or epidemiology. **A340**

Physician, graduate of Columbia P. & S., with teaching and administrative experience in pediatrics, will consider administrative position in child hygiene. **A341**

Physician, age 33; M.D., University of Wisconsin; M.P.H., Harvard; specializing in industrial hygiene, will also consider general administration. **A342**

Physician, age 37, experienced in health administration of cities and states, will consider attractive opening in maternal and child health or health education. **A343**

Physician, age 48, present full-time county health officer with special interest in venereal disease control, will consider attractive opening. **A344**

Physician, M.B., Ohio State University; C.P.H., Harvard; with special interest in industrial hygiene, will consider position as epidemiologist and health officer. **A345**

Physician, M.D., University of Maryland; C.P.H., Johns Hopkins; broad experience in county public health administration, will consider opening of better class. **A346**

CHILD HYGIENE

Woman physician, M.D., Rush Medical, wishes administrative or clinical position in maternal and child health. **C347**

Woman physician, M.D., Yale; Dr.P.H., Yale; experienced in pediatrics and administration of state bureau, will consider attractive opening. **C348**

LABORATORY

Gentleman, Ph.D., University of Southern California; special courses at Pasteur Institute, Paris, wishes position as director of a laboratory, in research work or in field investigation. Has had wide experience as instructor in bacteriology in a State University, director of a state hygienic laboratory, director of several hospital laboratories, and research assistant, department of bacteriology in a western university. **L315**

STATISTICIAN

Young man with 8 years' experience in public health statistics in well known national organization, and degree in Business Administration, now employed, will consider statistical position or combination with office administration. **A310**

MISCELLANEOUS

Woman, with excellent preparation and wide experience in health education field; Organization, administration, supervision and program-making in city, rural and state work. Now employed but would consider good opportunity. $3,500 minimum. **M316**

NEWS FROM THE FIELD

MASSACHUSETTS DUST AND FUME CODE COMMITTEE

COMMISSIONER James T. Moriarty, of the Massachusetts Department of Labor and Industries, has appointed the following committee to assist the Department in the preparation of rules and regulations for the control of hazardous dusts and fumes in the manufacturing establishments of the states:

Joseph C. Aub, M.D.,† of the Collis P. Huntington Memorial Hospital; Associate Professor of Medicine, Harvard Medical School, Boston, Mass.

E. H. Ballard, General Foundry Superintendent, General Electric Company

John Daniels, Legislative Agent, Associated Industries of Massachusetts

Philip Drinker, B.S.,† Professor of Industrial Hygiene, Harvard University School of Public Health, Boston, Mass.

Laurence Foley, International President, Granite Cutters International Association of America

Francis T. Hunter, M.D., of the Massachusetts General Hospital

William M. Rand, President, Merrimac Chemical Company

Robert J. Watt, Secretary-Treasurer, Massachusetts Federation of Labor

Stephen E. Whiting,† Chief Engineer, Liberty Mutual Insurance Company, Boston, Mass.

In the field of industrial dust control, the current undertaking is a sequel to the investigation and report of the Massachusetts Special Industrial Disease Commission of 1933–1934 and the findings of the Granite Dust Control Project conducted by the Department's Division of Occupational Hygiene during 1935 and 1936.

As a basis for the establishment of maximum allowable concentrations of industrial fumes, the committee has before it a tabulation in which all standards known thus far to have been promulgated are combined with tentative figures proposed by the Division of Occupational Hygiene and the criticisms of 22 authorities in this country and abroad to whom these figures were submitted. This is believed to be a more comprehensive symposium of opinion on the subject of allowable fume concentrations than has previously been undertaken by any governmental authority.—Manfred Bowditch, Director, Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, Boston, Mass., September 14, 1937.

SALLY LUCAS JEAN ELECTED PRESIDENT OF THE ASSOCIATION OF WOMEN IN PUBLIC HEALTH

AT the 17th annual meeting of the Association of Women in Public Health held at the Hotel McAlpin, New York, October 7, Sally Lucas Jean,* Executive Secretary, Health Section, World Federation of Education Associations, was elected to succeed Dr. Mary L. Lakeman as President of this national group of health workers in the fields of public health, medicine, nursing, bacteriology, chemistry, statistics, and health education from all parts of the United States.

* Fellow A.P.H.A.
† Member A.P.H.A.

The other officers include: Florence Mirick Ross, M.D.,† of Rhode Island College of Education, as Vice-President; Pauline B. Williamson, B.S.,* Director of the School Health Bureau, Metropolitan Life Insurance Company, as Secretary; and Marjorie B. Illig,† National Commander of the Women's Field Army of the American Society for the Control of Cancer, as Treasurer.

DELTA OMEGA OFFICERS

AT its annual meeting on October 6, Delta Omega, the honorary public health society, elected Thomas Parran, M.D.,* Surgeon General, U. S. Public Health Service, Washington, D. C., and William H. Park, M.D.,* Director Emeritus, New York Department of Health Laboratories, New York, N. Y., as honorary members.

The national officers for the ensuing year are:

President, Samuel C. Prescott, Sc.D.,* Cambridge, Mass.

Vice-President, John Sundwall, M.D.,* Ann Arbor, Mich.

Secretary-Treasurer, Milford E. Barnes, M.D., Dr.P.H.,* Iowa City, Iowa.

NATIONAL SAFETY COUNCIL OFFICERS

THE National Safety Council's new officers, elected at the 26th National Safety Congress and Exposition, held October 13, are:

D. D. Fennell, Chicago—President

W. H. Cameron, Chicago—Managing Director (reëlected)

C. W. Dempesy, Chicago, Vice-President for Finance

Harry Guilbert, Chicago—Vice-President for Membership

Frank Harrison, Chicago—Vice-President for Industrial Safety

A. V. Rohweder, Duluth—Vice-President for Community Councils

Walter S. Paine, Hartford—Vice-President for Engineering

A. W. Whitney, New York—Vice-President for Education

Governor Harold G. Hoffman of New Jersey—Vice-President for Public Safety

WORLD FEDERATION OF EDUCATION ASSOCIATIONS

LEADERS in health and education, concerned with promoting health through the schools of the world, met at Tokyo, Japan, in August, 1937, in the Seventh Biennial Conference of the Health Section, World Federation of Education Associations. There were 347 in attendance from 19 countries. All phases of Health Services, Health Education, and Physical Education were presented.

A report of the proceedings will be published within a few months. Current summaries will also be issued by the Secretariat for the benefit of Health Section members concerning international health services of all kinds, private and national.

The Secretariat of the Health Section, 200 Fifth Avenue, New York, N. Y., will continue to assemble reports on health problems in the various countries, together with methods used in solving these problems and the results obtained by such methods as they affect the school program and the health of children. The officers elected to serve for the next 2 years are:

Chairman: Prof. Clair E. Turner,* United States

Vice-Chairmen: Dr. Y. Yoshida, Japan; Robert H. Hazemann, M.D.,† France

Executive Secretary: Sally Lucas Jean,* United States

Treasurer: R. J. Faust, Jr., United States

ALABAMA PROVIDES SYPHILIS DRUGS

AS a part of its campaign against syphilis, the State Department of Health of Alabama will distribute without charge drugs for the treatment of venereal diseases. Heretofore this service was available only for the treatment of indigent persons.

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* Fellow A.P.H.A.
† Member A.P.H.A.

INDIANAPOLIS CANCER CLINIC

THE Indianapolis City Hospital, Indianapolis, Ind., has received a gift of $100,000 to establish and endow a cancer clinic. Edwin L. Patrick, President and Secretary of the C. B. Cones & Son Manufacturing Company, is the donor. The clinic will be named Patrick Hall, in memory of Mr. Patrick's wife.

Complete equipment for the treatment of cancer, including X-ray machines and radium, will be provided and accommodations for 22 patients will be available. Dr. Charles W. Myers is superintendent of the hospital.

HOSPITAL FOR NEGROES

THE dedication of a group of 3 buildings for the care of feeble-minded Negro children took place in Crownsville, Md., July 23. Erected at a cost of about $283,000, the hospital is said to be the first state owned institution of its kind in Maryland.

Equipped with 100 beds, half for boys and half for girls, the buildings were laid out so as to facilitate enlargement to care for 500 children. Dr. Robert P. Winterode, Superintendent of the Crownsville Hospital, about half a mile away, is in charge. Twenty children were admitted July 26.

HEART DISEASE COURSE

THE New York Heart Association plans a second series lecture course on heart diseases during the fall and winter of 1937–1938. The first of twelve afternoon lectures will be given November 9, and they will continue at bi-weekly intervals up to and including April 26, 1938.

The course is endorsed by the New York Academy of Medicine, and is open to all practising physicians without registration or admission fee. It is designed to give the general practitioner a better understanding of problems pertaining to the treatment of certain types of heart disease. For the convenience of those residing outside of Manhattan, two of the lectures will be given in Brooklyn and one in the Bronx.

The first lecture will be on "The Management of Patients with Heart Disease," by Dr. Irving Roth, on Tuesday, November 9, at 4:30 P.M., in the Blumenthal Auditorium of Mount Sinai Hospital, New York. Other lectures in the course, to be given by leading heart specialists, will be announced later.

CENTENARY OF CHARLES FREDERICK CHANDLER

AT Columbia University, New York City, from October 6 to November 4, there was a celebration of the 100th anniversary of the birth of Charles Frederick Chandler, father of modern industrial chemistry, and the first public health chemist in New York City. There were included Chandler memorial lectures in the fields of chemistry, medicine, and public health. The Chandler Medal of Columbia University was presented to Dr. John Howard Northrop of the Rockefeller Institute for Medical Research.

Haven Emerson, M.D.,* Director of the Institute of Public Health and the School of Medicine, spoke on October 20, on New York's First Public Health Chemist.

GLENN DALE SANATORIUM

THE Government of the District of Columbia, on September 15, dedicated the new 5 story Glenn Dale Sanatorium for adults at Glenn Dale, Md. Dr. Thomas Parran * was the principal speaker. The Sanatorium represents a two million dollar plant with 400 bed capacity, built on a cubicle system, for

* Fellow A.P.H.A.
† Member A.P.H.A.

the hospitalization of tuberculosis. Most of the rooms are equipped for 2 patients. The addition of this adult division of 400 beds to the children's division makes a total of 700 beds and an investment of more than three million dollars for this Sanatorium. This is in addition to 200 available beds at the Gallinger Municipal Hospital, and a total of 900 beds against 662 deaths from tuberculosis in 1936. All municipal hospitals in Washington are now under the authority of George C. Ruhland, M.D.,* Health Officer.

GEORGIA PUBLIC RELATIONS BUREAU

THE Medical Association of Georgia has established a Public Relations Bureau to work in coöperation with the Georgia State Departments of Public Welfare and Health, it is reported.

With offices at the Association's headquarters, 38 Prescott Street, N. E., Atlanta, Ga., the Bureau will disseminate health information in a statewide educational campaign among physicians and the public.

MALARIA PROJECT

A SURVEY on malaria in Escambia County, Fla., will be financed by the Rockefeller Foundation; Dr. John E. Elmendorf, Jr., of the Foundation staff, will be in charge of the survey, with headquarters in Pensacola.

Of the $8,000 to be spent for the first year's work, the city and county will each pay $1,000.

Dr. Elmendorf will also be Director of a malaria division to be formed in the Escambia County Health Department.

DIABETES RESEARCH

A TRUST fund of a million dollars has been given to the Children's Hospital, Pittsburgh, Pa., for "perpetual research in the causes, treatment and cure of diabetes in the youth of the Pittsburgh area." Miss Emily Renziehausen is the donor.

The first income of the fund will be used to build an addition to the hospital, to be known as the Renziehausen Memorial Ward and Clinic. In addition, Miss Renziehausen has given an eleven-acre farm as a site for a home for convalescent children.

It is provided that any income not needed for work on diabetes may be devoted to other research work and hospital service.

ALABAMA INDUSTRIAL HYGIENE DIVISION

THE Alabama State Department of Health has created a Division of Industrial Hygiene, with headquarters in Montgomery, with Dr. William F. Queen in charge.

PERSONALS

Central States

DR. JOHN E. ATTWOOD, of LaCrosse, Kans., has been appointed Health Officer of Rush County, succeeding DR. NORVAL W. ROBISON, of Bison, who held the position 4 years.

DR. FLOYD C. BEELMAN, of Wichita, Kans., has been appointed Health Officer of Sedgwick County.

DR. WARREN C. BREIDENBACH, of Dayton, Ohio, has been appointed a member of the Ohio Public Health Council, to succeed GEORGE D. LUMMIS, M.D.,* of Middletown.

CLIFFORD C. CORKILL, M.D.,† of Fennville, has been appointed Director of the new Joint District Health Department composed of Ontonagon and Baraga Counties, with headquarters at L'Anse, Mich.

JOSEPH W. DAVIS, M.D.,† of Charlotte, Mich., has resigned as Health Officer of Eaton County, to accept a similar position in Marion County, W. Va. He will be succeeded by MORLEY B. BECKETT, M.D.† (Health Officer of

* Fellow A.P.H.A.
† Member A.P.H.A.

Allegan County), as Acting Health Officer of Eaton County, until Dr. Davis's successor is selected.

WILLIAM DEKLEINE, M.D.,* Medical Director of the American National Red Cross, was awarded an honorary degree of Doctor of Science by Hope College, Holland, Mich., recently.

DONALD M. HARRIS, M.D.,† of Omaha, Neb., has been named Director of the new health unit established in Lincoln County, with headquarters at North Platte.

DR. DAVID KLIGER has been appointed Coördinator in Wayne County for the administration of the afflicted children acts. Dr. Kliger took office September 1, with headquarters at the Juvenile Division of the Probate Court, 1025 East Forest Avenue, Detroit.

DR. EDWARD A. MEYERDING,† of St. Paul, Minn., Secretary of the Minnesota State Medical Association, and Executive Secretary of the Minnesota Public Health Association, has been granted a year's leave of absence by the State Medical Association.

DR. STANLEY L. MOSESKI, of Grand Rapids, Mich., has been appointed Health Officer of Yuma County, Ariz., on a full-time basis. He succeeds DR. CALVIN A. EATON, of Yuma, who held a temporary, part-time appointment.

A. L. RINGLE, M.D., who recently completed a course in Public Health at the University of Minnesota, Minneapolis, Minn., has been appointed Cowlitz County Health Commissioner, with offices in Kelso, Wash.

DR. HENRY G. STEINMETZ, Assistant Superintendent of the Logansport State Hospital for the last 3 years, has been appointed Supervisor of Health in the Sixth District, composed of Monroe, Lawrence, Brown, Morgan, and Johnson Counties, with headquarters at Indiana University, Bloomington, Ind.

HOMER H. WILLIAMS, M.D., Bacteriologist in the Health Department of Dayton, Ohio, since 1923, has been appointed Health Commissioner, to succeed the late ARTHUR O. PETERS, M.D.†

Eastern States

MARGARET G. ARNSTEIN, R.N.,† formerly Consulting Nurse in Communicable Diseases in the New York State Department of Health, Albany, has been appointed Assistant Professor of Nursing Education on the faculty of the University of Minnesota, Minn.

OSKAR BAUDISCH, PH.D., recently of Stockholm, Sweden, has been appointed Director of Research at the Simon Baruch Research Institute for Balneology and Hydrology to be established at the state spa at Saratoga Springs, N. Y. Dr. Baudisch is a native of Austria; recently he has been Research Associate at the University of Stockholm. Plans for the establishment of the Research Institute have not been completed.

DR. WILLIAM W. BOLTON, of Lansdowne, Pa., has been named Director of the Division of Syphilis and Genito-Infectious Diseases in the Pennsylvania State Department of Health, succeeding DR. EDGAR S. EVERHARDT.

CHARLES WALTER CLARKE, M.D.,† formerly Medical Director of the American Social Hygiene Association, New York, N. Y., who was lent to the New York City Department of Health in 1935 to organize its Bureau of Social Hygiene, has returned to active duty with the Association with the title of Executive Director. WILLIAM F. SNOW, M.D.,*

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* Fellow A.P.H.A.
† Member A.P.H.A.

is General Director of the Association.

DR. HILARY J. CONNOR, of the staff of the Rhode Island State Department of Health, Providence, has been appointed Superintendent of State Sanatorium, Wallum Lake, to succeed DR. ROBERT LEMLEY GARRARD, resigned.

FRANCIS V. CORRIGAN, M.D.,† was appointed Chief of the Bureau of Child Hygiene in the Rhode Island Department of Public Health on July 1. He was formerly Director of Clinical Activities in the Bureau of Child Hygiene.

DR. IRVIN E. DEIBERT, of Haddonfield, N. J., has been reëlected President of the New Jersey State Board of Health, and E. W. SMILLIE, V.M.D., of Plainsboro, has been elected Vice-President.

MARION A. GLEASON, M.D.,† Chief of the Bureau of Child Hygiene in the Rhode Island Department of Public Health for the past 13 years, retired on pension on June 30, 1937.

DR. FREDERICK W. PARSONS, New York State Commissioner of Mental Hygiene since 1927, has resigned.

GEORGE HERBERT RAMSEY, M.D., DR.P.H.,* Assistant Commissioner in the New York State Department of Health, Albany, has been appointed Commissioner of Health of Westchester County, N. Y., succeeding MATTHIAS NICOLL, JR., M.D.,* Commissioner since 1930. Subject to confirmation of the appointment by the State Civil Service Commission, Dr. Ramsey expects to join the staff of the Westchester County Department of Health about December 1, 1937, and will succeed Dr. Nicoll as Commissioner on his retirement May 1, 1938.

DR. ROMEO ROBERTO has been appointed Director of Gray Oaks Hospital for the Tuberculous, Yonkers, N. Y., succeeding DR. EUGENE F. MCGILLIAN,† new Health Commissioner of Yonkers.

THEODORE ROSENTHAL, M.D.,† of New York, has been appointed Director of the Bureau of Social Hygiene of the New York City Department of Health, succeeding CHARLES WALTER CLARKE, M.D.

DR. CHARLES D. SHIELDS,† of Buffalo, N. Y., has been appointed Assistant District Health Officer for Central New York.

ALFRED E. SHIPLEY, M.D., DR.P.H.,* formerly Deputy Commissioner in the Department of Hospitals, New York City, will now give a majority of his attention to his duties as Professor of Preventive Medicine and Community Health in the Long Island College of Medicine, Brooklyn, N. Y. One of the new district health centers of New York City is to be operated in connection with Dr. Shipley's department.

ERNEST L. STEBBINS, M.D., C.P.H.,* District State Health Officer at Rochester, N. Y., has been appointed Director of the Division of Communicable Disease of the New York State Department of Health, Albany, N. Y.

V. A. VAN VOLKENBURGH, M.D., DR.P.H.,* District State Health Officer at Ithaca, N. Y., has been appointed Assistant Commissioner for Local Health Administration in the New York State Department, effective in September.

CECILIA E. WALSH,† Director of Public Health Nursing in the Bureau of Child Hygiene of Rhode Island, has resigned from that position. She is now connected with the American Red Cross as District Supervisor.

Southern States

DR. JULIUS B. ASKEW, of Little Rock, Ark., has been appointed Health

* Fellow A.P.H.A.
† Member A.P.H.A.

Officer of Independence County with headquarters at Batesville.

DR. THOMAS T. BOX, of Double Springs, Ala., has been named Health Officer of Winston County, succeeding HERBERT A. MCCLURE, M.D.†

DR. WEDFORD W. BROWN, Health Officer of the Athens-Clarke County, Ga., Board of Health, has been named President of the Georgia Public Health Association.

DR. ALBERT S. J. CLARKE, of Little Rock, Ark., has been appointed Health Officer of the district unit composed of Arkansas, Prairie, and Monroe Counties, with headquarters in Clarendon.

DR. RANDOLPH COMPTON, of Louisville, Ky., has been appointed Health Officer in Greenup County, Ky., with headquarters in Greenup.

DR. GEORGE M. DECHERD, of Austin, Tex., was recently appointed Health Officer of Austin, to succeed EUGENE O. CHIMENE, M.D.,† who resigned.

DR. ALBERT S. DIX, of Mobile, Ala., has been named Health Officer of Jackson County, succeeding DR. GEORGE E. NEWTON, formerly of Scottsboro, who was appointed to a similar position in Lauderdale County.

FLOYD S. DOZIER, M.D.,† of Clarendon, Ark., has been appointed Health Officer of the newly organized health unit in Polk County, with headquarters in Mena.

DR. LEROY L. FATHERREE, of Little Rock, Ark., has been appointed Health Officer of the Craighead and Poinsett District, with headquarters at Jonesboro.

DR. DOYLE W. FULMER, of Benton, Ark., has been appointed to take charge of the Division of Malarial Control of the Arkansas State Department of Health, Little Rock. Dr. Fulmer has recently returned from Harvard University Medical School, Boston where he took a year's graduate work on leave of absence from the State Department.

WILLIAM B. GRAYSON, M.D.,* of Little Rock, Ark., has been reappointed State Health Officer for a second term of four years.

DR. MARVIN M. HARRIS,† formerly Instructor in Bacteriology at the Johns Hopkins School of Hygiene and Public Health, has been associated with the Division of Laboratories of the Georgia State Department of Health at Atlanta since May, 1936, and has been appointed Director of the newly established Branch Laboratory of the Georgia Health Department at Waycross, Ga.

DR. MAX F. MCALLISTER, of Fayetteville, Ark., has been appointed Health Officer of Miller County, with headquarters at Texarkana.

DR. THOMAS J. MCCAMANT,† formerly Health Officer of El Paso, Tex., and El Paso County, has been appointed Health Officer of the San Antonio schools.

HERBERT A. MCCLURE, M.D.,† of Double Springs, Ala., Health Officer of Winston County, has been appointed Health Officer of the full-time Health Department that has been organized in Choctaw County.

DR. MARTLE F. PARKER, of Boaz, Ala., has resigned as Health Officer of Monroe County, to begin the private practice of medicine. He is succeeded by DR. GEORGE E. MADDISON, of Moncton, N. B.

DR. DERRIC C. PARMENTER, formerly of Greenup, Ky., and recently in charge of public health work in Greenup County, has been appointed Health Officer of Breathitt County, with headquarters at Jackson.

DR. MAURICE L. PETER, of Blackwell, Okla., has been appointed Medical Director of a new health unit established in Kay County.

* Fellow A.P.H.A.
† Member A.P.H.A.

DR. WALTER W. POIMBOEUF, of Bastrop, La., has been appointed Health Officer of Claiborne Parish, succeeding HARRY R. MARLATT, M.D.,† of Homer, resigned.

DR. WINSTON C. RIGGINS, of Little Rock, Ark., has been appointed Health Officer of the district composed of Ashley, Chicot, and Desha Counties, with headquarters at Hamburg.

FRANK L. ROBERTS, M.D.,† of Trenton, Tenn., will be in charge of the Department of Preventive Medicine which has been established in the University of Tennessee. The department will be jointly supported by the University, the Tennessee State Department of Health, and the Tennessee Valley Authority. Dr. Roberts will be full-time Professor of Preventive Medicine, and LLOYD M. GRAVES, M.D.,† Health Officer of Memphis, will be Associate Professor. An associate professor of epidemiology will be added January 1 and later an associate professor of sanitary engineering.

DR. ELIHU F. SLOAN, of Shannon, Ala., has been appointed Health Officer of Shelby County, Ala., succeeding DR. HUGH C. NICKSON, formerly of Columbiana, who has resigned to enter private practice.

DR. WILLIAM E. TAYLOR, of Springfield, Mo., has been appointed full-time Health Director and Instructor in Bacteriology and Physiology at Teachers' College, Springfield. Dr. Taylor has been in private practice.

DR. THOMAS M. TOWNS, of Clarence, Ala., has been appointed Health Officer of Blount County, succeeding SAMUEL D. STURKIE, M.D.,† of Oneonta, who accepted a similar position in Calhoun County.

ARTHUR M. WASHBURN, M.D.,† has been placed in charge of the Division of Communicable Disease Control of the Arkansas State Department of Health, Little Rock. Dr. Washburn has recently returned from Harvard University Medical School, Boston, where he took a year's graduate work on leave of absence from the State Department. He formerly served as Health Officer of Blytheville, Ark., and of Mississippi County.

DR. THOMAS OSCAR VINSON, of Macon, Ga., Assistant Health Officer of Bibb County, has been appointed Health Officer of Spalding County with headquarters at Griffin.

DR. LEVI C. WAYLAND, of Plainview, has been appointed Health Officer of Hale County, Tex., to succeed the late DR. EDGAR F. MCCLENDON.

RAYMOND E. WEHR, M.D.,† of Bedford, Ky., has been transferred as Health Officer from Johnson County to Trimble County.

THOMAS B. WILSON, M.D.,† of Longview, Tex., has resigned as Health Officer of Gregg County, to accept a similar position with the Corpus Christie-Nueces County Health Unit.

Western States

CHARLES M. CREE is Director of the Division of Health Education which has been established in the New Mexico State Health Department.

R. G. M. EHLERS, M.D., has been appointed Health Officer of Lewis and Clark County, and the City of Helena, Mont.

JACQUES P. GRAY, M.D., M.P.H.,* formerly Deputy Director in the San Francisco City and County Department of Health, and more recently Director of the Angeline Elizabeth Kirby Memorial Health Center, Wilkes-Barre, Pa., has become Director of Public Welfare for the City and County of San Francisco. Dr. Gray has returned to the Coast and assumed his new duties on September 10.

* Fellow A.P.H.A.
† Member A.P.H.A.

DR. RULAND W. HUSSONG, Health Officer of Phoenix, Ariz., has resigned, to enter private practice.

DR. RICHARD A. KOCH, of Tacoma, Wash., has been appointed Health Officer of Whitman County.

ELROY F. MCINTYRE, M.D.,† of Santa Fe, N. M., has been appointed State Epidemiologist in the New Mexico State Health Department, to succeed LEONARD A. DEWEY, M.D., C.P.H.,† who resigned to become State Epidemiologist of Washington. DR. FRANK W. PARKER, JR., formerly of Clovis, succeeds Dr. McIntyre as Health Officer of the First District.

HOWARD L. MCMARTIN, M.D., of Twin Falls, Idaho, has been appointed Director of the Twin Falls County Health Unit, succeeding JAMES W. HAWKINS, M.D.,† who became state Health Director.

KARL F. MEYER, PH.D.,* Chairman of the Department of Bacteriology and Director of the Hooper Foundation for Medical Research, University of California, San Francisco, Calif., has been awarded the honorary degree of Doctor of Medicine at the University of Zurich, Switzerland, his alma mater.

DR. HARRY E. RHODEHAMEL, of Spokane, Wash., was elected President of the Public Health League of Washington at the annual meeting during the convention of the Washington State Medical Association in Seattle in July.

DR. JOHN C. SHARP, of San Jose, Calif., has been appointed Director of Public Health of Monterey County.

DR. JOHN H. TRUESDAIL, recently a Rockefeller Foundation fellow working with Dr. Roger J. Williams at Oregon State College, has become associated with Truesdail Laboratories, Inc., in Los Angeles, Calif., founded and directed by DR. ROGER W. TRUESDAIL.†

EDWARD L. VAN AELSTYN, M.D.,† has been appointed to have charge of the Southeastern District of the new public health unit established in Utah, with headquarters in Price.

DR. HARRY C. WATKINS, of Hoquiam, Wash., has been appointed Health Officer of Grays Harbor County.

Canada

DR. CHESLEY F. BLACKLER, formerly of Montreal, Que., has been appointed Health Officer of Kingston, Ont.

DR. GEORGE E. MADDISON, of Moncton, N. B., has been appointed Health Officer of Monroe County, Alabama, with headquarters in Boaz, Ala.

DEATHS

DAVID HENDRICKS BERGEY, M.D., B.Sc., DR.P.H.,* research biologist and former Professor of Bacteriology and Hygiene at the University of Pennsylvania, Philadelphia, Pa., died September 5, at the age of 76. In 1915 he was elected President of the Society of American Bacteriologists. He was connected with the Department of Hygiene and Bacteriology of the University of Pennsylvania from 1893 to 1932. He was the author of *Bergey's Manual of* Determinative Bacteriology.

DR. H. K. MULFORD, Director of Research and Biological Laboratories of The National Drug Company, Philadelphia, Pa., died October 14, at the age of 71.

GEORGE H. SIMMONS, Editor and General Manager Emeritus of the *Journal of the American Medical Association*, died September 1 at the age of 85.

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† Member A.P.H.A.

CONFERENCES AND DATES

American Academy of Orthopaedic Surgeons. First West Coast Meeting. Hotel Biltmore, Los Angeles, Calif. January 16–20, 1938.

American Association for the Advancement of Science, and Annual Science Exhibition. Murat Theater, Indianapolis, Ind. December 27–30.

American Association of Pathologists and Bacteriologists. Atlantic City, N. J. May 3–4, 1938.

American College of Physicians,. Waldorf-Astoria Hotel, New York, N. Y. April 4–8, 1938.

American Education Week. November 7–13.

American Institute of Nutrition. Baltimore, Md. Spring, 1938.

American Medical Association. San Francisco, Calif., June 13–17, 1938.

American Statistical Association. (Several sessions on Vital Statistics and Biometrics.) Haddon Hall, Atlantic City, N. J. December 27–31.

American Veterinary Medical Association. New York, N. Y. July 5–9, 1938

American Water Works Association. New Orleans, La. April 24–28, 1938.

Association of Pacific Fisheries. Del Monte, Calif. November 8–10.

California Fruit Growers and Farmers Convention. San Jose, Calif. December 6–8.

Congress of American Physicions and Surgeons. Atlantic City, N. J. May 2–6, 1938.

Connecticut Public Health Association. Hotel Bond, Hartford, Conn. December 1.

Dairy Products Association of the Northwest. St. Paul, Minn. April, 1938.

Dental Meeting, Thirteenth Annual. Pennsylvania Hotel, New York, N. Y. December 6–10.

Fifth International Heating and Ventilating Exposition. Grand Central Palace, New York, N. Y. January 24–28, 1938.

Florida Public Health Association. Tallahassee, Fla. December 6–8.

Georgia Public Health Association. Atlanta, Ga. May, 1938.

Health Education Conference for School Nurses of New Jersey. Atlantic City, N. J. November 12–13.

Interstate Milk Producers Cooperative. Philadelphia, Pa. November 17–18.

Iowa Public Health Association. Des Moines, Ia. May, 1938.

Massachusetts Public Health Association. Boston, Mass. January 27, 1938.

Medical Library Association. Boston, Mass., May, 1938.

Michigan Public Health Association. Lansing, Mich. November 10–12.

Mississippi Public Health Association. Second Annual Meeting. Jackson, Miss. December 9–10.

National Conference of Social Work. Seattle, Wash. June 26–July 2, 1938.

National Warm Air Heating and Air Conditioning Association. New York, N. Y. January 24–26, 1938.

New Jersey Health and Sanitary Association—63rd Annual Meeting. Princeton, N. J. December 10–11.

New Mexico Public Health Association. Albuquerque, N. M. November 18–19.

New York State Health and Physical Education Association. Syracuse, N. Y. December, 1937.

New York State Milk Distributors, Inc. Buffalo, N. Y. November 10–11.

Pan American Medical Association—Seventh Cruise Congress to Havana. (Pan American Medical Association, 745 Fifth Avenue, New York, N. Y.) January 15–31, 1938.